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FORMERLY

AMERICAN GAS LIGHT JOURNAL

VOL. CVIII., No. 9
WHOLE No. 3130

NEW YORK, SATURDAY, MARCH 2, 1918

Subscription $3 per year
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COMPARISONS STORAGE	VS.	INSTANTANEOUS
5 No. 18 KOMPAK AUTOMATIC WATER HEATERS	TO	1 No. 4 AUTOMATIC INSTANTANEOUS WATER HEATER
3¾ FEET ¾ FOOT PER HEATER	PEAK LOAD PER MINUTE	4 FEET
Approx. $20 $4 PER HEATER	GAS REVENUE PER MONTH	Approx. $4
$400 $80 PER HEATER	SALES REVENUE	$135
NONE USE METER IN HOUSE	GAS METER REQUIRED	20 LIGHT
½"	GAS LINE REQUIRED	1"
EACH ABOUT THAT OF A TANK HEATER	INSTALLATION COST	FIVE TIMES AS MUCH—20 LIGHT METER NOT INCLUDED
ALMOST NIL	MAINTENANCE COST	IMPORTANT FACTOR
UNLIMITED LARGE FLOW— Hot Water as Fast as Cold from Each Heater	HOT WATER SERVICE	LIMITED FLOW

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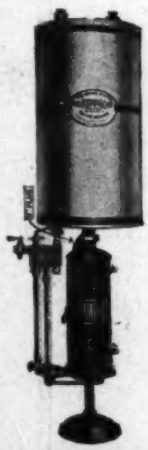
NONE USE METER IN HOUSE	GAS METER REQUIRED	30 LIGHT
½"	GAS LINE REQUIRED	1¼"
EACH ABOUT THAT OF A TANK HEATER	INSTALLATION COST	SEVEN TIMES AS MUCH—30 LIGHT METER NOT INCLUDED
ALMOST NIL	MAINTENANCE COST	IMPORTANT FACTOR
UNLIMITED LARGE FLOW— Hot Water as Fast as Cold from Each Heater	HOT WATER SERVICE	LIMITED FLOW

INSTALLING



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AMERICAN
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Vol. CVIII, No. 9 NEW YORK, MARCH 2, 1918 Whole No. 3130

Elimination of Need of Readjusting Crucible Over Fire Three or Four Times During Melt One of Advantages of Gas for Brass Melting

Important Details in Designing Furnace—Burners Employed—Maximum Gas Consumption—Gas Required Per Pound for Various Compositions—Increase in Life of Five Heats Per Crucible in Gas Furnaces as Against Coke

By CHARLES C. KRAUSSE
Consolidated Gas, Electric Light and Power Company of Baltimore, Baltimore, Md.

Brass is an alloy consisting of copper and zinc, with copper as the chief constituent. Its mechanical properties vary with the various percentages of the metals in the mixture; therefore, before taking up the matter of actually melting this metal, it might be of interest to know just what effect the various metals have on each other when alloyed together.

The term "brass" is properly applied to alloys of copper, the properties of which are modified chiefly by the addition of zinc, up to approximately 42 per cent. Many of the commercial brasses contain small percentages of tin and lead, and certain well-known alloys belonging under the general classification of brass have their properties modified by the addition of iron, manganese and aluminum.

Tin in Brass

Chart 1 shows the melting temperatures, tensile strength and ductility of various mixtures of copper and zinc. The tensile

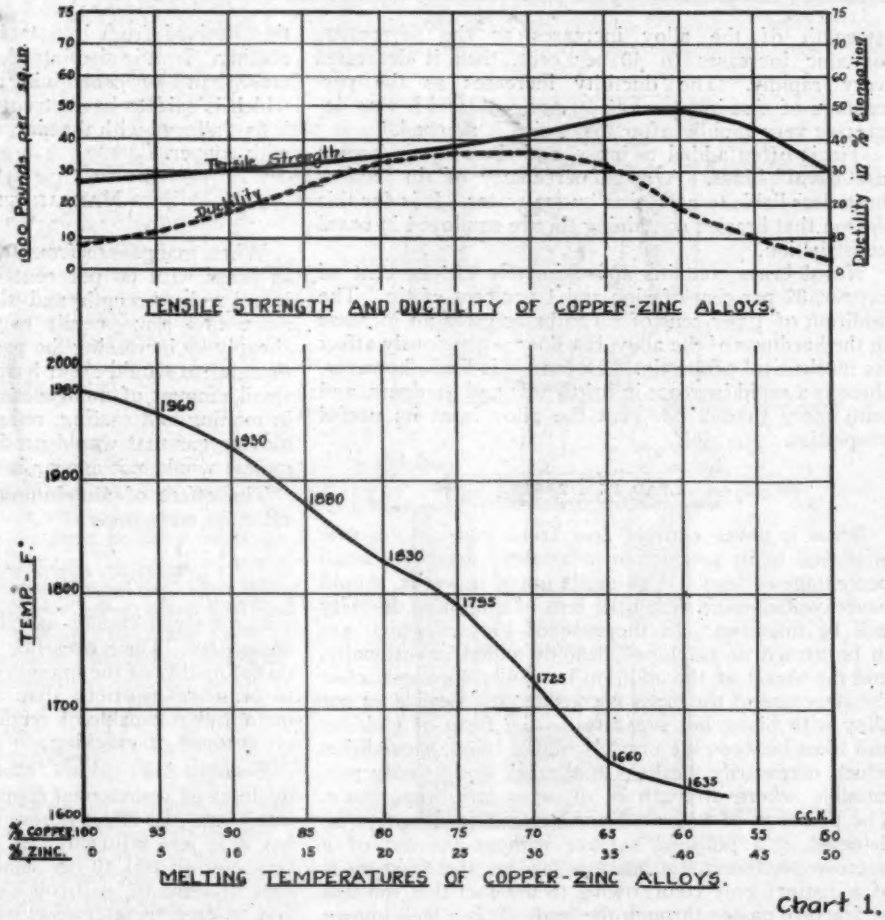


Chart 1.

strength of the alloy increases as the percentage of zinc increases to 40 per cent, then it decreases very rapidly. The ductility increases as the percentage of zinc increases to 30 per cent, and it also decreases very rapidly after that point is reached.

Tin is often added to brass, and the alloy is known as "naval" brass. A small percentage of tin renders brass less liable to corrosion by sea water. It is for this reason that brasses containing tin are employed in naval construction.

Naval brass contains approximately 62 per cent of copper, 37 per cent of zinc and 1 per cent of tin. The addition of 1 per cent of tin to brass gives an increase in the hardness of the alloy, but does not seriously affect its mechanical properties. Beyond this limit, however, there is a rapid increase in brittleness and hardness, and with more than 2 per cent the alloy loses its useful properties.

Lead in Brass

Brass is never entirely free from lead, as the zinc employed in its production invariably contains a small percentage of lead. High-grade brass, however, should never contain more than 1 per cent of lead or its ductility will be impaired. In the case of brasses which are to be turned or machined, lead is added intentionally, and the object of the addition is readily apparent when the structure of the brass is considered. Lead does not alloy with brass, but separates in the form of globules and films between the crystals of the brass, a condition which necessarily weakens the metal, and is only permissible where strength is of secondary importance. The presence of 2½ or 3 per cent of lead cannot be detected in a polished surface without the aid of a microscope, but if the brass is broken, the fracture is of a distinct gray color, owing to the fact that the line of fracture passes through the lead. It is a well-known fact that a pure brass is difficult to turn, owing to the nature of the turning, which is long and tenacious, and tends to obstruct the mechanism of automatic machines. A slow speed has to be employed, and frequently a burr is produced which is difficult to remove.

Brass containing lead, however, behaves very differently. Owing to the fact that the lead is in a free state, the alloy is less tenacious, and the turnings break off through the lines of weakness caused by the lead, so that chips are produced instead of long spiral turnings. Moreover, the lead appears to act as a lubricant, with the result that a much higher speed can be employed and a better finish given to the work.

Iron is often present in brass in very small quantities, derived from iron tools used during melting and cooling. Iron is also introduced into brass up to a little more than 1 per cent, giving an alloy called "detalmetal," which is said to have strength and ductility. The iron is first alloyed with the zinc, and this alloy is then melted with copper.

Manganese in Brass

When manganese from 0 to 7 per cent displays zinc in brass with 60 per cent copper, the effect is slight increase in strength and slight decrease in ductility; since this same result could be accomplished more cheaply by increasing the proportion of zinc, the use of manganese would seem hardly justified. Of course, a small amount of manganese would be useful as a flux in melting and casting, reducing copper oxide, and removing gas that would produce porosity, but this manganese would not appear in the alloy.

The effect of aluminum in brass is practically the same as manganese.

Arsenic and Antimony in Brass

Commercial copper usually contains these metals as impurities. Their presence has an important influence on the quality of the brass produced. Antimony appears to be more injurious than arsenic, and even in small quantities is capable of rendering brass unfit for rolling on account of cracking.

Bismuth also occurs, though more rarely, in some qualities of commercial copper, and hence finds its way into brass. Its effect is very similar to that of antimony, but it is less injurious. A brass composed of 60 per cent copper and 40 per cent zinc, containing 0.02 per cent of bismuth, will roll almost as well as pure brass and be free from cracks; whereas, if it contained that

amount of antimony instead of bismuth, the brass would be unfit for rolling.

It is not difficult to understand the nature of the behavior of these impurities. Neither antimony nor bismuth is appreciably soluble in copper or in copper-zinc alloys. The result is that when the brass cools down and solidifies, the antimony and bismuth, having much lower melting points than the brass, remain liquid, and finally solidify between the crystals of the brass. Consequently, each grain or crystal of the brass is separated from its neighbor by a thin brittle film, and when the brass is rolled, these separating layers are incapable of withstanding the strain, and the alloy cracks. Arsenic, on the other hand, is slightly soluble in copper, and is, therefore, less harmful. In fact, it has a hardening effect upon the copper, and its presence is sometimes actually beneficial, provided the point of solubility is not exceeded.

Phosphor Bronze

While phosphor bronze is distinct from the brasses, its use is so common in the brass foundries that it is worthy of mention. It contains from 88 to 92 per cent of copper and from 8 to 12 per cent of tin. To get the best results just enough phosphorus is used to thoroughly cleanse the metal of oxides, none being retained in the finished product.

When any alloy containing a high percentage of copper is melted in contact with air, there is a tendency to form copper oxide, the affinity of copper for oxygen being exceedingly strong. If the cooled alloy contains copper oxide, it is weak and brittle. Copper alloys are usually melted with charcoal upon the surface to prevent oxidation, but the prevention is not complete. If phosphorus is added to the alloy just before pouring, the copper oxide is reduced and phosphoric acid is formed; that is, the alloy is purified by the fluxing of the phosphorus. This increases both the strength and ductility of the alloy. If an excess of phosphorus is added, part of it may combine with the alloy and increase its strength and ductility, but the proportion should not exceed 0.1 per cent or brittleness results. It is probable that the chief value of its presence is to prevent the formation of oxide of copper during melting.

Why Copper Alloys Are Used

The copper alloys have no advantage over mild steel in strength, ductility and shock resistance, and since the cost is very much greater there must be some other advantage to lead to their selection for machine parts. These alloys are much safer against oxidation than steel, and hence are used for condenser tubes, often for feed pipes, for valves of many kinds and for many parts of mechanisms subject to corrosion. Moreover, these alloys have good anti-friction qualities and are used for wearing surfaces.

Brass Melting

Brass can be melted in two styles of furnaces, namely, the crucible furnace and the reverberatory furnace.

The reverberatory furnace does not require a crucible, the metal being placed in the direct heating chamber. This furnace can only be used economically where the metal contains very little zinc and tin, and also where a large quantity is to be melted at a time. The reason why this type of furnace is not used for melting brass containing a high percentage of zinc is because zinc will volatilize at the high temperature which this furnace produces.

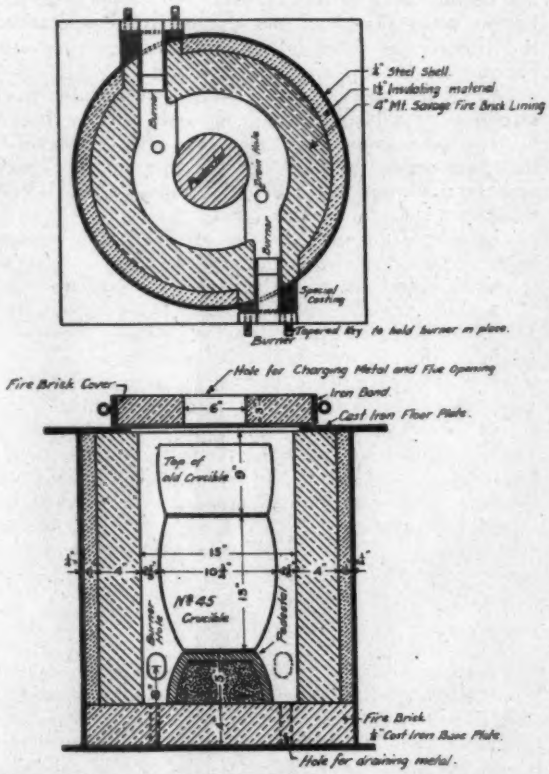
As there is a wide field for brass melting with gas to replace coke, and the majority of these furnaces are the crucible type, and necessary to be so because of the nature of the metal, the writer has confined his research to this type.

Present Coke Methods

The ordinary coke furnace usually consists of a steel shell lined with firebrick and provided with removable grate bars. The flue is located in the side near the top. The top of the furnace is level with the operating floor, and usually provided with a very crude cover. The flue must be connected to a chimney having a very good draft.

Before placing the crucible in the furnace, the fire should be well under way; there should be sufficient fuel in the furnace to form a solid bed from 8 to 10 in. thick between the grate and the crucible. The crucible is filled with metal and lowered into the furnace by tongs (see Chart 10) and set evenly on the bed of fuel. Coke is then placed around the crucible to the level of the top.

As the fuel burns away the crucible will settle gradually toward the grate, and to prevent its settling too low, it is raised occasionally by means of the tongs. The



GAS-FIRED CRUCIBLE FURNACE FOR BRASS MELTING.

Chart 2.

fuel from the sides settles down under it, the crucible is readjusted on the bed and fresh fuel added. In some cases the crucible may need adjusting in this way three or four times before the metal will be hot enough to be poured.

The Gas-Fired Furnace

As stated above, coke has been the fuel for melting brass for many years, and the average foundry man does not think, even to-day, that any other fuel can take its place. You are likely to hear from the foundry man that gas will not give sufficient heat, that it's a wet heat, etc. The first excuse is probably due to the fact that gas has been experimented with some years ago by the foundry man himself, and due to his lack of knowledge of the application of gas fuel, he failed to accomplish satisfactory results.

Design of Furnace

Chart 2 shows a coke-fired furnace converted to gas fuel. The grate bars are removed and a cast-iron base plate, covered with 4 in. of firebrick, is used in its place. This plate is provided with two holes about 1½ in. in diameter to drain the metal in case a crucible breaks while in the furnace. The slag which forms from time to time is also removed through these holes. It is necessary to keep these holes open at all times, and any slag that forms around them should be pushed out at once, as the slag will run partly through the hole and then cool and become very hard to remove. These openings in the bottom make practically no change in the operation of the furnace, as there is sufficient furnace pressure to prevent any excess air from entering.

One of the most important points to remember in construction of a brass furnace for gas fuel is the combustion space around the crucible. This is governed by the space needed by the tongs for removing the crucible and the minimum space that the tongs need will be the maximum space for combustion.

The side of the steel shell is first lined with insulating material about 1½ in. thick; magnesia blocks were used in this case and are giving very good satisfaction.

The lining consists of high-grade firebrick 4 in. thick. The cover for the furnace consists of a circular fire-clay disc 3 in. thick, with a hole 6 in. in diameter in the center. The hole is used for charging the metal and to allow the products of combustion from the gas to escape, as the old flue, which was located on the side, was bricked up in order to make the hot gas pass over the top of the crucible. A portion of this 6-in. opening is closed after charging with another disc with about a 3-in. hole. The cover is fitted with an iron band with eyes, by which it can readily be removed with chain tackle suspended from the ceiling.

Pedestal Block

As mentioned above, in the coke-fired furnace the crucible rests on the coke bed, but in the gas-fired furnace it is necessary to provide some support for it, as it must be above the burners, in order to prevent it from coming in the direct flame of the gas, which would shorten the life of the crucible and the bottom lining.

This support is known as the "pedestal block," and must be of a very good refractory material, in order to hold up under the intense heat produced in the furnace. We have found that an old crucible cut off the proper height and filled with a mixture of 80 parts of carborundum, 20 parts of batch clay (which is one-half red clay and one-half good paving sand), and 14 parts of silicate of soda and baked, makes a very good pedestal block. Over a six months' period these blocks have averaged 125 heats of 150 lb. per heat before it was necessary to renew them.

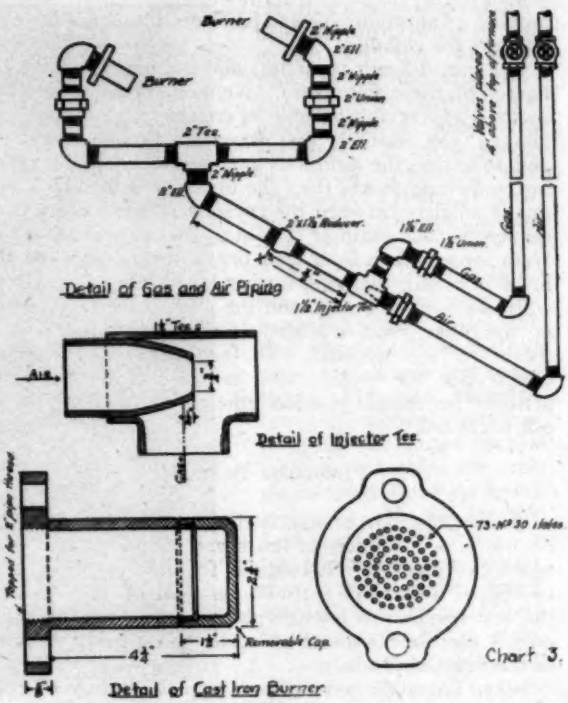


Chart 3.

Gas Burners

The burners for this furnace are blast type, the air being supplied by a No. 3½ Roots positive pressure blower, giving 1 lb. pressure at the furnace. As shown in Chart 2, the furnace is equipped with two burners, located near the bottom and tangential to the lining. The flame is so directed that it does not strike the pedestal block nor the lining, so as to prevent the lining and block from wearing away from the cutting action of the flame.

Chart 3 shows the design of burners, injector and piping layout. The maximum gas consumption of both burners is 500 cu. ft. per hour. Each burner has a total port area of 0.949 sq. in., making a total of 1.898 sq. in. The opening in the injector orifice is ¾ in. in diameter, having an area of 0.4418 sq. in. The injector-burner ratio is 1 : 4.27. The injector has a taper of 4 in. to 1 ft. Gas pressure at furnace 2½ in. Air pressure at furnace 1 lb.

The amount of gas to be burned in the furnace per hour was determined by two very important factors, namely, the amount of gas necessary to get out the required number of heats per day, and effect of this increase consumption on the consumer's demand.

The firm formerly put out not more than four heats

per day with coke, and then the furnace was going from 7 a. m. until 5 p. m., while our average time with gas was from 7 a. m. to 2 p. m. I will grant the fact that this is not any record-breaking time, but it is also of vital importance for the fuel engineer to study each installation from the gas company's viewpoint; that is, also try to improve the load factor of the company's output. To do this the hourly demand must be kept as low as it is possible, and the burning period as long as possible. This means a saving in the investment of larger mains, services and meters. In the case with our company it also means a saving to the customer, because all of our large consumers are billed on a schedule with a fixed charge based on the maximum hourly demand.

Gas Consumption

The amount of gas required to melt 100 lb. of brass has such a wide variation that it is almost impossible to safely quote any definite figure, unless extensive tests have been made over a long period of time. This figure depends upon the amount of metal melted at a time, the

FIRST HEATS.

Composition of Metal in Pounds					Total Weight	Time to Pouring Heat	Gas Cu. Ft	Cu. Ft per lb	Average
Tin	Lead	Zinc	Copper	Brass					
				145 Red	145	2 hr 45 min	1075	7.42	
				150 "	150	1 - 32 -	1000	6.67	
				150 "	150	2 - 18 -	1200	8.00	
				150 "	150	2 - 15 -	1150	7.67	
				150 "	150	2 - 6 -	950	6.34	7.31
				150 "	150	2 - 12 -	1125	7.50	
				150 "	150	2 - 7 -	1050	7.00	
				150 "	150	2 - 15 -	1200	8.00	
				150 "	150	2 - 5 -	1050	7.00	
				150 "	150	2 - 18 -	1125	7.50	
				140 Yellow	140	2 - 7 -	1100	7.86	
				140 "	140	2 - 6 -	925	6.61	
				134 "	134	2 - 9 -	1075	8.02	
				150 "	150	1 - 34 -	1075	7.17	7.10
				140 "	140	2 - 9 -	1075	7.68	
				148 "	148	2 - 5 -	1075	7.36	
				140 "	140	1 - 33 -	975	6.96	
				140 "	140	1 - 46 -	975	6.96	
				140 "	140	2 - 0 -	850	6.07	
				150 "	150	2 - 1 -	950	6.34	
				120 Yellow	150	2 - 38 -	1425	950	
				135 "	135	2 - 13 -	1200	8.89	
				135 "	135	2 - 58 -	1350	10.00	9.19
				125 "	125	2 - 24 -	1125	9.00	
				140 "	140	2 - 13 -	1200	8.58	
				150 Phos. Bz	150	2 - 1 -	1000	6.67	6.67
10		2	88	50 Copper	150	2 - 13 -	1125	7.50	
10		2	88	50 "	150	2 - 1 -	1100	7.34	
10		2	88	50 "	150	2 - 11 -	1225	8.17	
10		2	88	50 "	150	2 - 9 -	1150	7.67	7.83
10		2	88	50 "	150	2 - 15 -	1150	7.67	
10		2	88	60 "	160	2 - 16 -	1075	6.72	
5	1.5	135	80	40 "	140	2 - 18 -	1050	7.50	
5	1.5	135	80	59 "	159	2 - 36 -	1600	10.07	

Chart 5.

number of heats per day, the composition of the metal, the flux used, the method of charging metal, the pouring temperature desired (which depends on the style of castings to be made), and lastly, the efficiency of the furnace tender with regards to operation of the gas equipment and to determine just when the pouring temperature has been reached.

The metal should not be left in the furnace longer than is necessary to give it the degree of fluidity necessary to pour it, for if the temperature is increased beyond this point it will cause injury to the metal and may cause blowholes in the castings, especially if the metal has a large percentage of copper. The proper temperature can be determined only by watching the alloy closely during the melting. If, when a rod is inserted into the molten metal, no metal adheres when it is with-

SECOND HEATS.

Composition of Metal in Pounds					Total Weight	Time to Pouring Heat	Gas Cu. Ft	Cu. Ft per lb	Average
Tin	Lead	Zinc	Copper	Brass					
				150 Red	150	1 hr 45 min	725	4.83	
				150 "	150	1 - 25 -	725	4.83	
				150 "	150	1 - 38 -	800	5.34	
				130 "	130	1 - 24 -	625	4.81	
				150 "	150	1 - 43 -	800	5.34	5.11
				137 "	137	1 - 12 -	600	4.40	
				150 "	150	1 - 47 -	825	5.50	
				150 "	150	1 - 34 -	850	7.67	
				190 "	190	1 - 33 -	650	4.33	
				135 "	135	1 - 13 -	550	4.08	
				140 Yellow	140	1 - 36 -	700	5.00	
				135 "	135	1 - 34 -	625	4.63	
				150 "	150	1 - 28 -	675	4.50	
				145 "	145	1 - 18 -	675	4.66	
				140 "	140	1 - 30 -	700	5.00	
				150 "	150	1 - 32 -	900	6.00	4.83
				140 "	140	1 - 32 -	775	5.54	
				150 "	150	1 - 29 -	625	4.17	
				140 "	140	1 - 20 -	600	4.30	
				140 "	140	1 - 31 -	625	4.46	
				126 Yellow	126	1 - 54 -	875	6.96	
				150 "	150	1 - 45 -	775	5.17	
				148 "	148	1 - 37 -	900	6.08	6.01
				135 "	135	1 - 30 -	900	6.67	
				152 "	152	2 - 0 -	825	5.16	
				150 Phos. Bz	150	1 - 28 -	700	4.67	4.67
10		2	88	50 Copper	150	1 - 22 -	750	5.00	
10		2	88	50 "	150	1 - 23 -	625	4.17	
10		2	88	50 "	150	1 - 40 -	775	5.17	
10		2	88	50 "	150	1 - 29 -	650	4.33	4.94
10		2	88	52 "	152	1 - 25 -	750	4.93	
10		25	88	50 "	150	1 - 33 -	750	5.00	
5	1.5	136	80	54.5 "	156.5	1 - 50 -	870	5.65	
10		2	88	55 "	155	1 - 40 -	800	5.16	

Chart 6

drawn, the metal is at least hot enough to be poured. If it is held in the fire longer it will be injured by absorbing oxygen from the air.

The writer was very fortunate in having a foundry to experiment in where conditions were ideal for getting the data that is of importance to the industrial fuel industry. The owner of this foundry is an up-to-date business manager, and from the time the gas furnace was started he has the records of each and every heat, with regards to composition of metal, weight, time, gas consumption, etc.

Chart 5 shows the analysis of several "first heats" of various brasses. You will note a metal classed as monitor, and the amount of gas per pound of metal is very high, as compared with the others. This monitor metal is not a trade name, and probably unheard of outside of this particular foundry. This is simply a red brass that is used for a certain firm whose casting requires a very high pouring heat.

Charts 6, 7 and 8 show the analysis of several second, third and fourth heats, respectively. You will note that the time required per heat and the gas consumption decreases with each heat. This is due to, of course, the heating up of the furnace itself. We have been able to get out as many as six heats per day, but there were not a sufficient number of them made to get data for practical use.

The following figures would be perfectly safe to use, where a foundry runs from three to four heats per day, 125 to 150 lb. each; that is, providing, of course, they use reasonable amount of care in operating:

Composition of Metal	Gas Per Pound
Red brass	5.34 cu. ft.
Yellow brass	5.20 cu. ft.
Monitor metal (red brass—very high temp.)	7.00 cu. ft.
10 per cent tin, 2 per cent zinc, 88 per cent copper	5.51 cu. ft.
Phosphorus bronze	5.37 cu. ft.

THIRD HEATS.

Composition of Metal in Pounds.					Total Weight	Time to Pouring Heat	Gas Cu.Ft.	Cu.ft. per lb.	Average
Tin	Lead	Zinc	Copper	Brass					
				150 Red	150	1hr 33min	550	3.67	
				150 "	150	1 - 32 -	575	3.90	
				135 "	135	1 - 30 -	750	5.61	
				150 "	150	1 - 23 -	650	4.34	
				150 "	150	1 - 24 -	725	4.83	4.68
				150 "	150	1 - 23 -	675	4.50	
				133 "	133	1 - 18 -	650	4.88	
				150 "	150	1 - 34 -	750	5.00	
				150 "	150	1 - 24 -	650	4.33	
				150 "	150	1 - 41 -	850	5.67	
				108 Yellow	108	1 - 01 -	625	3.94	
				140 "	140	1 - 10 -	675	3.48	
				130 "	130	1 - 19 -	675	4.50	
				142 "	142	1 - 18 -	675	4.75	
				140 "	140	1 - 17 -	675	4.82	4.57
				140 "	140	1 - 30 -	625	4.47	
				145 "	145	1 - 16 -	686	4.31	
				140 "	140	1 - 26 -	625	4.47	
				140 "	140	1 - 24 -	800	5.71	
				130 "	130	1 - 17 -	725	5.57	
				126 Red	126	1 - 57 -	775	6.16	
				127 "	127	1 - 33 -	725	5.71	5.65
				150 "	150	1 - 48 -	825	5.50	
				148 "	148	1 - 37 -	775	5.23	
				100 Yellow	100	1 - 19 -	675	6.75	6.75
10		2	88	50 Gelb	152	1 - 46 -	825	5.43	
10		2	88	50 "	150	1 - 29 -	675	4.50	
10		2	88	48 "	148	1 - 35 -	750	5.07	4.89
10		2	88	50 "	150	1 - 28 -	675	4.50	
10		2	88	50 "	150	1 - 23 -	675	4.50	
10	0.5	1.5	88	50 "	150	1 - 46 -	800	5.33	

Chart 7.

The figures give us an average of 5.68 cu. ft. of gas per pound of metal, melted over a period of about five weeks, with the furnace operated with the ordinary coke furnace tender.

Chart 4 gives an analysis of average individual heats, regardless of the composition of the metal, and serves to show how the furnace tender operates the gas and air valves. An ideal chart would show a uniform gas consumption per hour for each heat, whereas this practical one shows a variation, which means that gas is either being wasted or too great a loss of metal due to having an oxidizing flame.

Shrinkage

Up to the present time we have not made any actual test to determine the loss of metal in melting, but the foundry manager has made several tests, and stated that the results were very satisfactory and the loss less than coke. In making a comparative cost of coke and gas I have assumed the shrinkage to be the same in each case, which I am sure is giving coke the benefit.

Crucibles

Before using a crucible, it should always be annealed; that is, brought slowly up to a temperature of about 250 deg. Fahr. and held there for sufficient time to allow it to be thoroughly dried out. It should be placed in the furnace without allowing it to cool, which would allow it to absorb moisture from the atmosphere. Crucibles should never be annealed in a core oven, because they will absorb moisture given off by the drying of the cores.

In placing a crucible in a furnace, care should be taken that it rests evenly over the entire bottom. In charging the crucible, great care should be taken to avoid wedging, as the crucible expands very little, and the wedged metals on heating up may crack it.

When taking the crucible out of the furnace with the tongs, care must be taken that the jaws of the tongs are below the largest part of the crucible, for if they are not the pot may slip out of the tongs before it reaches the top of the furnace, or as it is being carried, thus spilling and losing the metal and endangering the workmen. When the tongs clasp the pot a link is slid along the handles and made to press them tightly together; the pot can then be lifted out of the furnace.

The life of crucibles depends upon their quality and their handling. The coke-fired crucible is subjected to more wear than the gas-fired, because the coke is always

FOURTH HEATS.

Composition of Metal in Pounds					Total Weight	Time to Pouring Heat	Gas Cu. Ft.	Cu.ft per. lb	Average
Tin	Lead	Zinc	Copper	Brass					
				140 Red	140	1hr 32min	675	4.83	
				125 "	125	1 - 18 -	600	4.80	
				150 "	150	1 - 16 -	700	4.67	
				125 "	125	1 - 6 -	575	4.60	
				150 "	150	1 - 21 -	625	4.17	4.57
				140 "	140	1 - 22 -	700	5.00	
				150 "	150	1 - 16 -	700	4.67	
				150 "	150	1 - 19 -	650	4.33	
				150 "	150	1 - 20 -	650	4.33	
				150 "	150	1 - 27 -	650	4.33	
				150 Yellow	150	1 - 27 -	700	4.67	
				145 "	145	1 - 23 -	650	4.48	
				150 "	150	1 - 16 -	700	4.67	4.52
				140 "	140	1 - 14 -	600	4.29	
				140 "	140	1 - 25 -	650	4.64	
				150 "	150	1 - 36 -	600	4.00	
				100 Yellow	100	1 - 0 -	375	3.75	3.75
10		2	88	50 Gelb	150	1 - 35 -	725	4.83	
10		2	88	50 "	150	1 - 16 -	625	4.13	
10		2	88	50 "	150	1 - 42 -	675	4.50	4.85
10		2	88	50 "	150	1 - 13 -	800	5.33	
10		2	88	50 "	150	1 - 26 -	650	4.33	
15		2½	132		150	1 - 38 -	800	5.33	
5	1.5	1½	80	50 "	150	1 - 39 -	825	5.50	

Chart 8.

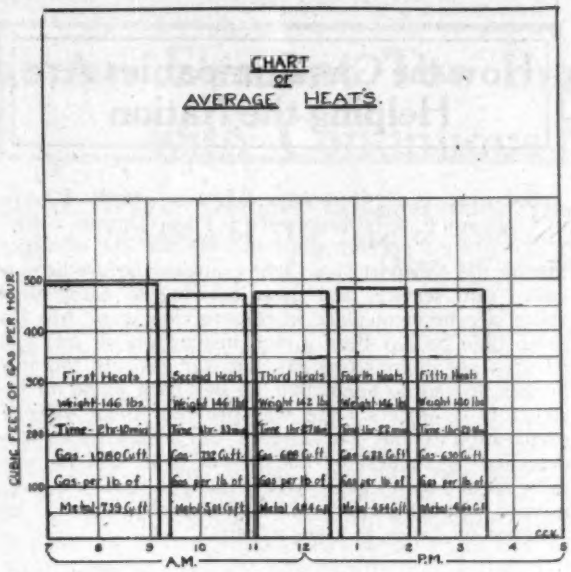


Chart 4.

caking around it, and the furnace tender is liable to strike it when fixing in fire; also it does not rest on a solid base and has to be moved sometimes two or three times before the metal is melted.

From actual tests we have shown an average increase of five heats per crucible with the gas furnace, against the coke furnace, and considering that the price of crucibles to-day are four times what they were before the war, one can realize the importance of this item alone.

COMPARATIVE COSTS

	Coke	Gas
Size of Crucible	45	45
Average number of heats	15	20
Total metal melted in pounds	2,196	2,920
Cost of crucible	$7.20	$7.20
Crucible cost per 100 lb. of metal	$0.328	$0.247
Average amount of coke per 100 lb.	75 lb.	....
Average cubic feet of gas per 100 lb.	....	568 cu. ft.
Cost of fuel	$12.00 per ton	$0.50 per 1,000 cu. ft.
Cost of fuel per 100 lb.	$0.45	$0.284
Total cost of crucible and fuel per 100 lb. of metal	$0.778	$0.524

In above comparison we have not capitalized the possible saving in shrinkage, labor saving, storage and handling of coke and ashes, and increased output, which are all in favor of the gas fuel.

Increase in Production of Natural Gas

Statistics just compiled under the supervision of J. D. Northrop, of the United States Geological Survey, Department of the Interior, show that the volume of natural gas commercially utilized in the United States in 1916 was greater than that so utilized in any other year in the history of the natural gas industry. The volume used, which amounted to 753,170,253,000 cu. ft., constitutes a new record, exceeding by nearly 125,000,000,000 cu. ft., or 20 per cent, the former record established in 1915.

The proportion of natural gas supplied to industrial consumers in 1916 was 4 per cent larger than in 1915.

Applying Graphics to Gas Mixtures

Edward J. Brady of the Physical Laboratory of the United Gas Improvement Company Illustrates How Method Employed In Expressing Characteristics of Alloys Can be Used Advantageously With Gases

Trilinear co-ordinates to express the characteristics of alloys consisting of three different metals were first used by Professor Thurston in 1877.

For a better illustration of their value, we may cite their use in the theory of color where any integral color may be represented by a point on a triangle, each corner representing 100 per cent of one of the three primary sensations.

The fact that this method of graphical representation can be admirably applied to the determination of the characteristics of gas mixtures seems to have been overlooked, declares Edward J. Brady, of the Physical Laboratory of the United Gas Improvement Company, in the *Journal* of Franklin Institute for February.

In a mixture of three gases the heating value of the mixture is equal to the sum of the products of the percentage of each constitutent multiplied by its respective heating value. This is also true of specific gravity, as well as the amount of air necessary for complete combustion.

It follows from the above that if on each of the three corners of a "gas mixture triangle" we erect perpendicular lines proportional to the heating value of the constituent at that corner, the upper ends of these lines will determine a plane. This plane, which we may call the heating value plane, will, in general, make an angle with the plane of the paper. Contours, or lines of equal heating value, drawn upon this plane will be straight parallel lines, making angles with the sides of the triangle, depending upon the heating value of the particular gases mixed. Such lines are the loci of an infinite number of mixtures of the three gases represented, all having the same heating value.

Similar systems may be drawn for specific gravity and air required for complete combustion.

The latter system will, in general, be almost parallel with the heating value contours, because of the fact that heating value is roughly proportional to the number of O_2 atoms required for complete combustion.

Specific gravity contours or lines of equal gravity generally cross the heating value lines at certain angles. It is thus possible to eliminate one of these variables from experiments on gas mixtures.

Traveling along one of the gravity contours changes the heating value, but not the gravity, and vice versa.

These lines are all straight because of the linear relation between the particular characteristics so chosen, viz., heating value, gravity, etc., and the quantity of gas involved.

However, other characteristics of the mixture may also be represented, as velocity of inflammation by curved lines.

The "gas mixture triangle" is not limited to pure gases. We may determine the characteristics of such gases as coal gas, water gas, and oil gas in the ordinary way, using these values to construct a triangle, and proceed as above. The quality of a mixture may be decided upon and its position on the diagram located at a point. A circle drawn with the point as a center will establish a tolerance outside of which the mixture must not fall. Other uses will suggest themselves.

How the Gas Companies Are Helping the Nation

CORPORAL P. J. JOHNSTON, of Newport, R. I., now of Company F, 301st Engineers, at Camp Devens, Mass., is occupying a peculiar position. He was the efficiency man at the Newport Gas Light Company before he was called into service, and upon arriving at camp soon found a prominent place in construction work, but for some time he has been giving instruction on gas and its use—not illuminating gas, but war gas. In this line he has proved so adept that he has been made an instructor of officers. He was ordered to an officers' preparation school, but after a day's stay there was detached by request of his colonel, who said he was more needed by his class. He is likely to receive a commission without going to the officers' school, and to be assigned to duties as a gas expert.

H. W. GEE, formerly cadet engineer for the Atlanta Gas Light Company, of Atlanta, Ga., entered the Coast Artillery Sept. 1, 1917, and is now stationed at Fort Screven, Savannah, as second lieutenant.

LUTHER H. JOHNSON, formerly employed in the general offices of the Western United Gas & Electric Company, Aurora, Ill., is now a first lieutenant in the aviation section of the United States Army and is in France.

THOMAS A. CORBY, formerly of the Central Hudson Gas & Electric Company, of Poughkeepsie, N. Y., is now located at Dorr Field with the 503rd Aero Construction Squadron at Arcadia, Fla. For a time after leaving the Poughkeepsie company he was employed by the Government on construction work at Langley Aviation Field, Hampton, Va. Since then he has been commissioned a second lieutenant and assigned to the above squadron.

GEORGE P. SMITH, JR., manager of the Old Colony Gas Company, East Braintree, Mass., has recently been commissioned a captain in the Ordnance Department.

WILLIAM SMITH, for a period of ten years cashier with the Portland Gas Light Company, Portland, Me., is now serving as a first lieutenant in the aviation section of the Signal Corps. Lieutenant Smith was among the first to enlist in Portland, and he entered the aviation section as a private in Washington. He has had wide experience in military training, serving under Col. Theodore Roosevelt in Cuba, and was also stationed in the Philippine Islands.

THE HAVERHILL GAS LIGHT COMPANY, of Haverhill, Mass., co-operated with the Food Conservation Committee in its recent food conservation demonstration, which was conducted at the milk station, 88 River Street, for foreign women with an interpreter. The gas company loaned the gas stoves for the demonstration. Hortense Pierce gave the demonstration with about twenty women present. There was also a demonstration of cornmeal recipes in connection with the milk demonstration.

Human Element Too Important to Be Ignored with Continuous Vertical Retorts

Robert E. Wyant Outlines Considerations That Are Met and Have to be Dealt with in Operation of This Type of Carbonizing Equipment—Results Obtained Over an 18-Month Period

The carbonization of coal is essentially a chemical process in which perhaps the first function in importance is the ability to adjust the quantity, intensity and distribution of heat in the retorts at will and to maintain any desired condition of heating without change, declared Robert E. Wyant, engineer of the New Haven Gas Light Company, of New Haven, Conn., in a paper presented before the New England Association of Gas Engineers at Boston, Feb. 21. Next in importance, I would place the mechanical problems of getting coal into the retorts, taking away the volatile products, and removing and quenching the coke. That this process, so easily outlined, is crowded with difficulties is best evidenced by the enormity of the effort spent by generations of able men who have devoted their lives to the task of reaching out for the ever receding ideal. And after a century of effort the ideal is still far to seek.

The first concept naturally led to a crude and simple retort easily operated by hand labor, and it is a notable fact that we, here, have seen and can almost see to-day, the whole array of carbonizing plants from the crudest to the highest type yet evolved. The necessity for the production of large quantities of gas long ago led to the application of mechanical labor-saving devices, and to-day we have very perfect machinery by which to accomplish most of the functions formerly requiring hand labor in all types of apparatus. In fact, years ago, the substitution of machinery became burdensome through its cost and maintenance, and other means were sought to reduce not only the hand labor, but, as far as possible, machinery as well. So we had reversions to the inclined retorts, where the coal needed only to be elevated by machinery, and the coke taken away. It seems a simple matter to incline the retort still further, and yet the vertical retorts have been a long time in coming, at least for the primary purpose of gas production.

Woodall-Duckham Type of Retorts Employed

During the past five years many installations of both intermittent and continuous types of verticals have been installed in this country, all based more or less closely upon European design, and all types have been pretty fully described in papers read before various gas associations and the results obtained have been reported, and are well known.

That these results, coupled with the inherent characteristics of the various systems have appealed to gas managers is best evidenced by the number of installations made in recent years. I take it that the writer's experience, which has been confined to the Woodall-Duckham type of continuous verticals, has not been essentially different from that of other operators of this type of apparatus. It is not my purpose therefore to go largely into detail, either as to description of the plant, or the results obtained, but to confine myself more especially to some of the details, to be met and dealt with in the operation of the apparatus.

In order to be intelligible, I will outline briefly our installation, noting particularly such details as may serve to distinguish it from other similar installations, and comment on some details which may apply more generally.

Outline Description of Installation

We have then thirty-two retorts set in eight benches of four retorts each. The eight benches are arranged in two stacks of four side by side. Each stack forms a complete unit, having its own coal and coke bunkers, coke storage bin, conveyor and foul main. The coal and coke bunkers are carried above the settings, and feed coal and coke directly to the retorts and producers. The bunkers are served by a Peck carrying conveyor, which makes a complete loop, passing the entire length of the retort house under the retorts, up the end walls of the building, to an elevation above the bunkers, and over the bunkers and coke storage bin. Each of these conveyors is supplied with a Merrick conveyor scale.

Between the two stacks of benches are placed a radial brick chimney and a B. & W. waste heat boiler having 2,175 sq. ft. of heating surface. Above the boiler is a Green Economizer, containing ninety-six 4-in. tubes, 9 ft. long, enclosed by insulated steel plates. The flue gases from both stacks of benches pass either directly to the chimney under natural draft or through the waste heat boiler and economized under the induced draft. At the outlet of the economizer, a motor-driven exhaust fan delivers the cooled flue gases to the chimney, when the boiler is in operation.

The retorts are rectangular in section 7½ in. x 5 ft. 10½ in. at the top and 20 in. x 5.3 in. at the bottom and 25 ft. long, and made up of small rectangular blocks. The lower 5 ft. of the retorts is built of fire clay blocks around which the primary air circulates on its way to the producer. The remaining 20 ft. of the retorts and the combustion chambers are built of silica material, and in this portion of the retorts the carbonization is practically completed. Adjacent to the broad sides of the retorts, four rectangular flues, virtually combustion chambers, are built extending downward from a point as near the top as practicable, about 20 ft.

Admission of Steam

The producer gas and secondary air are led into the flues, through separate ducts for each flue, at the top and the resultant products of combustion are taken away at the bottom where the vertical flues meet the waste gas flues. The waste gases pass to flues in the recuper-

ating space, rise to the top of the bench on one side and drop down to the main flue connection at the bottom of the opposite side, where they are controlled by the main flue dampers. A pyrometer tube is set in the main flue of each bench back of the damper. A secondary air port is set on each side of the main damper, while the primary air passages extend continuously across the bench on each side of the lower side of each pair of retorts. The four passages thus formed are provided at each end with an adjustable damper set in the outside walls of the bench. The two passages on each side are connected at the center to a common duct, which conveys the heated primary air through the side of the producer ash pit. The steam used in the producer is admitted through a nozzle into this duct, and serves to draw in the primary air and produce a slight pressure on the entire producer. This pressure is sufficient to prevent air from being drawn into the producer and to assure a proper distribution of producer gas to the combustion flues.

Each bench is provided with a producer set in the forward part of the space between the two pairs of retorts, the remainder of this space below and at the rear of the producer being filled by the recuperators.

The producers have a grate area 4 ft. x 6 ft. x 4½ in., or 25½ sq. ft., and a total depth of approximately 14 ft. and a maximum fuel depth of 10 ft. The producer stoke hole lid is set in the top of the bench, and is charged from a fixed chute from the overhead coke bunkers. The original construction of the producer followed closely the English design, and gave us much trouble. A simple modification was made, however, which greatly improved the distribution of coke and accessibility of the fires for cleaning, beside making a far more durable setting.

Tar Collecting Tank Built Under Retort House Floor

The four retorts of each bench are connected through individual 8-in. inverted V-shaped take-off pipes to a common rectangular pitch box without seal placed but a few inches above the top of the bench and nearly over its center. At the apex of the bench the take-offs are provided with a combined cleaning opening and valve, for use when the retort is to be shut off. We find this arrangement very convenient and effective. The pitch box is provided with a tar overflow, which determines the level of the tar in the box, and with large sealed openings on each side for cleaning.

Advantages and Disadvantages of Location and Arrangement of Pitch Box and Connections

All of the tar removed from the gas is brought to tar collecting tanks built under the retort house floor, and from these tanks is circulated continuously through the pitch boxes. This tar circulation, by its condensing action, serves to remove a large proportion of the high-boiling tar vapors in the pitch boxes, which would otherwise be carried to the foul main, and by thinning it reduces the liability of stoppage in the tar drains. The re-distillation of the light vapors also helps the foul main to carry the heavy tar carried over.

The location and arrangement of the pitch box and connections has both advantages and disadvantages. The pipes are of large section, short and easy to clean and conveniently located. Combined with the pitch box, the arrangement is compact and perfectly accessible, and on the main operating level. The disadvantages are due to the hot location, with little chance of radiation and proximity to the producer charging lid. In warm weather the added concentration of heat on the working floor is perhaps somewhat more troublesome for the operators.

In the case of one or more retorts of a bench working badly there is a possibility of the tar boiling over and catching fire at the producer lid. This has happened with us occasionally, but without any serious results. I am not at all sure that I should care to change our arrangement.

As previously noted, our producers have a total depth of about 14 ft. from the charging lid to the grate bars, and the coke is charged into them directly through a fixed chute from an overhead bin. I feel sure now that this arrangement, while it is the acme of simplicity and convenience, is a mistake. We did not take into consideration the sorting action of this method of charging, which resulted in spreading the coarse coke around the edges of the producer and leaving all the breeze in a compact pile in the center. After much experimenting, we were finally compelled to charge the producers with screened coke. This requires extra handling of all coke to the overhead bunkers, but gives us a homogeneous producer fire. In other installations, made before and since ours was built, shallowed producers charged by weighed coke from a charging larry, there has been no trouble in using unscreened coke.

Selective Distribution of Heat

Since our benches were started in May, 1915, we have done much experimenting in the distribution of heats in the retorts. From my point of view the distribution of heats is of more vital importance, if possible, with gravity systems than with others, as faulty heats not only vitiate good results, but may readily enough stop the operation of the retorts completely. In 1915, candle-power requirements were of greater moment than at present, and our guarantee contained this requirement among others. On this account, careful study was given to the ability to vary the amount of superheating space in the top of the retorts, and an adjustable separator was placed between the coal inlet and gas take-off. This was found in practice to be unnecessary, and was later removed, as cracking of the gases is entirely possible without any special provision for the purpose. Since the early running of the house, we have been lowering the heated zone down towards the bottom of the retorts with much smoother operation and less holding up of the charges. It is evident that the entire working length of the retort should be heated to a carbonizing temperature, and that the carbonization be not completed until the bottom of the retort is reached. Otherwise part of the capacity of the retort is unused, and if carbonization be complete the used portion must operate at extremely high temperature, with the production of over-cracked gaseous products, and soft friable coke.

By approaching the condition of a practically uniform temperature of about 2300 deg. Fahr. throughout the retort, we find that the charge moves freely with results as follows: Candle-power, 15.7; B.t.u., 580; yield, 5.20; tar, 13 gal., and ammonia, 4.75 lb. Gradual carbonization throughout the retort is evidenced by a good grade

Date	Average Make Per Day	Average Number of Retorts	Average Make Per Retort Per Day	Average Yield Per Pound	Average Fuel to Producer Per 100 Lb. Coal	Average Candle-power	Average B.t.u.
1916							
January	845,000	14.56	58,058	5.19	12.03	16.18	590
February ...	780,793	13.98	56,247	5.17	15.55	15.98	576
March	813,580	13.86	58,769	5.36	13.94	15.75	568
April	834,400	14.02	58,590	5.39	14.21	15.90	578
May	738,032	14.36	51,443	5.40	14.40	15.71	574
June	735,133	14.43	50,938	5.34	14.08	15.83	578
July	743,419	14.55	51,057	5.22	13.02	16.03	575
August	1,183,161	22.00	53,841	5.56	14.50	15.72	561
September ..	1,564,333	28.84	54,264	5.45	14.45	15.14	560
October	1,626,451	29.25	55,662	5.29	14.25	15.08	562
November ...	1,731,500	29.38	58,920	5.23	14.37	15.23	559
December ...	1,696,451	29.96	58,579	5.16	14.20	15.26	575
1917							
January	1,693,871	27.95	60,559	5.30	13.77	14.79	584
February ...	1,579,071	25.78	61,259	5.32	14.31	15.47	576
March	1,627,484	25.61	63,649	5.42	16.29	15.53	577
April	1,565,566	25.30	61,888	5.25	14.41	16.14	583
May	1,603,548	25.44	62,905	5.22	13.48	16.12	583
June	1,459,333	24.68	59,139	5.02	14.82	16.05	583

of coke and by a variation in the density of the coke produced—that from the core being much denser than that exposed to the walls of the retorts. This difference is quite marked in examining the coke from retorts differently heated. I am unable to present to you comparative statements of results under various heating conditions, however, owing to the fact that up to the present time the heat control has not been carried out to a degree, so far as I know, in any system of continuous verticals, to enable one to maintain the exact selective distributions of heats desired, and necessary for the exact comparison of results under small differences in distribution. I would not be understood to infer that heats cannot be, or are not, maintained at present to a degree to enable one to obtain results comparable with those obtained by other systems of carbonization. I have the belief rather that no other system now in use possesses so wide a range of selective results if the heat distribution can be maintained exactly as desired. The concentration on high candle-power is fortunately the most difficult and undesirable selection involving as it does delicate cracking of the hydrocarbons at the expense of larger yield of other valuable constitutents.

Steaming of Continuous Verticals

In line with the present trend towards producing the maximum yield in gas value at minimum cost per unit, the candle-power standard should be universally eliminated. To this end the steaming of retorts opens a wide field for investigation and gives promise of marked advance in the production of economical gas with large yields of valuable by-products. This practice has been far more common in Great Britain than in this country by reason of the lower candle-power requirements and the larger use of vertical retorts. I would like particularly to call attention to an important paper on this subject recently read by John West before the Southern Association of Gas Engineers and Managers, and reported in the issue of Nov. 15, 1917, of the (British) *Gas Journal*.

I append the above table, which shows the principal results of operation of our vertical house for the eighteen consecutive months from Jan. 1, 1916, to July 1, 1917. I should have been glad to have included the results for the last six months of 1917, but have not done so because during each month there have been periods where it was impossible to avoid combining the results with those of our horizontal house. I have no reason to believe, however, that the results are essentially different from those of the first half of the year.

The make figures shown in columns one and three are corrected to 3-in. water pressure and 60 deg. Fahr. The make per retort, column three, shows much variation during the year 1916. In May will be noted a sharp decline which indicates a revulsion of felling. The drop was due to previous acute trouble from the effort to get capacity with too high temperature in the upper part of the retorts. The period following to the end of the year is one of extreme caution with gradually increasing working heat and lowering heat zone. The first half of the year 1917 shows a considerable general improvement, which has been maintained to the present time.

Big Labor Turnover

It is fair to say that throughout the entire period for which results are given, labor conditions were acute. Over 125 inexperienced men were hired to maintain a needed force of sixteen men out of a total of twenty-one.

All of the results noted were obtained with Westmoreland coal, except those for June, 1917, where a marked falling off in make and yield are noted due to poor coal.

The reported yield per pound, column four, is based upon an arbitrary addition of 2 per cent to the weight of coal taken. This figure, however, has proven too low and we are now adding 4 per cent to offset the coal shrinkage.

(*Continued on page* 206)

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Health and Comfort of Our Citizens in Their Homes Dependent Upon the Public Utilities

Secretary of the Treasury William G. McAdoo, in his letter to the President, gives various reasons why the public utilities should not be permitted to become weakened. The one that impresses us most is that in which he states "the health and comfort of our citizens in their homes are dependent upon them." To us that seems the most important, and it points to the gas companies more directly than to any other branch of the utility field.

It is true that the soldier must have toluol to successfully combat his specialized foe. But what good is the powder if he cannot have his heart in the task? The Government in its liberal soldiers' insurance and compensation plan—also a product of Mr. McAdoo's energies—has demonstrated how great a part it considers the spirit of the soldier is influenced by the degree of anxiety he must feel in regard to the welfare of those he has left behind. And what avail is it to him that those about whom his affections are entwined are assured of a competence if that will not spare them from the rigors of a severe winter? There are some comforts that are just as essential to life as food.

It would be interesting to know how much the humanitarian viewpoint influenced the President and the Secretary of the Treasury in the attitude they have taken. Judging from past actions, we are inclined to believe it must have been the predominant influence. We wonder, too, how much the manner in which some gas companies stepped into the breech this winter to avert human suffering tended to make them look with kindly eyes upon the perplexities of the utilities.

The immediate effect of the exchange of letters between the President and the Secretary of the Navy will be a clearing away of all doubts as to utility rates. It is true that, so far as we are aware, there is no law that can compel a local regulatory commission to grant an increase should the Secretary of the Treasury so suggest, but we cannot imagine any commission that will not immediately comply. An incisive query from one who has the country so strongly behind him as does Mr. Wilson as to whether the intention is "to co-operate or obstruct," has more effectiveness behind it than a thousand laws. Court actions require time. Public opinion punishes at once.

No gas company with a meritorious claim needs to doubt that its increase will be granted. The skies have cleared almost over night.

But a tremendous responsibility has been placed upon the gas industry. The Government has cleared away its handicaps. It expects it to fulfill its mission.

Its primary duty is to prevent suffering, hardship and inconvenience to the people of the country. It must provide toluol up to the limit of its capabilities. It must

provide fuel for the industries. It must teach its consumers to conserve gas, at the same time providing them with all the gas their legitimate needs require.

It is a time to take stock. Are our capacities sufficient to enable us to fulfill all our responsibilities? If not, we should know what is needed, and if the means are available, which it is probable they will be, provide it.

Are we sure that, with the gas available, we are in a position to avert hardships and discomforts in the home? It will not be sufficient should some one freeze for us to say: "The gas was there, if he had had a heater he could have used it." It is our business to see that he has the means, if we can possibly induce him to provide it.

It is the time for some companies, fortunately few, to resurrect their merchandising departments. It is the time for other companies to turn their merchandising departments loose in the same aggressive fashion they were working before a senseless fear of the future inspired retrenchment. It is the time for those companies which kept their heads to go on as they have been going, only more intensively.

The Biggest Return Already Collected

The "fiend for figures" was trying to calculate how much more gas the Consolidated Gas Company, of New York, is going to sell during a period of years because of the large quantity of heaters sold during the record cold spell.

We told him the company had already collected its biggest return, and could be well satisfied even if the heaters have already gone into perpetual disuse.

He couldn't grasp it.

Few of the readers of this journal, we hope, have ever been reduced to the extremity where they no longer had money in their pocket to last them through the next twenty-four hours. But some surely have found themselves, by accident, of course, in a distant part of the city without carfare home.

Then along came Jones and advanced a nickel.

That nickel assumed great proportions. It meant something. It was sorely needed. There was a very warm spot in the recipient's heart towards Jones—a feeling that endured. Even the hundred-dollar check the affluent uncle sent the day after pay day did not inspire such gratitude as did Jones' nickel.

So it was with those who bought the heaters. There was no coal home, and considerable suffering. There was gas, but no way of utilizing it for heating.

Some of the buyers, perhaps, had scoured the department stores and found them sold out—it is human always to leave to the last the most obvious means of solving a problem. Then they had come to the gas company.

If it, too, had been sold out, there would have been no resentment; only bitter disappointment. It would have been the expected.

But instead there was the assiduous salesman, happy, apparently, at the opportunity to sell an appliance, at a reasonable price, that a few minutes before the purchaser would have been willing to pay five times its proper value to obtain.

So we say, the Consolidated has already collected its biggest return.

It has been collected in the form of good will.

Even in a city whose population runs into millions, the grateful friendship of five thousand is a factor of considerable real value to a utility management.

Electricity and Petroleum Products vs. Gas As Fire Hazards

Figures published for the first time by the National Board of Fire Underwriters show that in 1916 gas again has shown up favorably, due to the smallness of fire loss attributable to it. Electrically caused fires did an aggregate damage of $16,559,433. Petroleum and its products were the root of a $5,070,100 loss. Gas-caused fires damaged property to the value of $1,815,597. Of this amount over $1,000,000 of damage is concentrated in States where natural gas supplies an important proportion of all used. And all the gas-caused fires are classified as strictly preventable.

Thus gas as a fire hazard is not a very important factor at the worst. But every gas-caused fire, whether due to the carelessness of the consumer or a defective appliance, is a black spot on the repute of the fuel. It is the duty of the industry to lessen the number of such fires to as great a degree as is humanly possible to accomplish.

A big step towards doing this would be the use of discrimination in the type of appliance the gas company itself sells, and educational work towards making it impossible for any dealer to sell an appliance in the territory that is not all it should be.

Gas companies themselves should determine the merits or demerits of the appliances offered them. There are reputable appliance manufacturers whose word is as good as gold, who have a pride in their product, and who do not permit their salesmen to misrepresent or exaggerate particular merits. There are likewise manufacturers, apparently respectable, who make merely to sell, and who have no regard whatever for the repute of the gas company or its future welfare. The weakness in judging appliances by the manufacturer's statement lies in the hows of determining which representative is disreputable and which is reputable. It is easy to establish a temporary reputation, and before the bubble bursts of its own accord many gas companies may have put on their lines appliances that they

would be glad to get off again at twice the price they sold them for.

The gas appliance testing laboratory becomes more and more each year a necessity to the gas company that is big enough to maintain one with a competent staff of workers. Those companies which cannot afford this should make arrangements with larger companies who can for the purpose of getting opinions on the appliances they consider purchasing.

The company should then not only offer itself on a broad scale as a consultant on appliances, but advertise broadly and regularly its willingness to render this service to any gas user, whether he intends to buy his appliance from the company or not.

Should this course be followed it is possible that gas as a fire hazard would become negligible. Also, we would have fewer cheap heaters, fewer cheap and inefficient gas ranges and fewer imitation lighting mantles on our lines.

Getting something for nothing is impossible. The heater that is abnormally cheap is usually cheap in every sense. So is the range and the lighting mantle.

If it costs the Welsbach Company, for instance, with its immense plant and output, and consequent lowering of overhead, a certain amount to make a certain mantle, it is as sure as the world is round that the mantle that is made at half that cost is about half as good, if not less.

When we have a more general adoption of appliance-testing laboratories we are going to have a higher plane of selling prices for appliances. No company, with its own knowledge of the merits or demerits of an appliance before it, is going to buy that appliance to sell it to its consumers, if it is not to the consumer's advantage to have it, whether it can be sold at a bargain price or not. And to get the appliance it knows is the right appliance to use it is going to pay a higher price than it is now paying. It costs something to get something.

Human Element Too Important to Be Ignored With Continuous Vertical Retorts

(*Continued from page* 203)

The bench fuel reported in column five is cold coke including ash. For the last six months reported one idle bench was maintained under partial heat and the estimated fuel for this bench was uniformly deducted from the total in arriving at the reported figures. The average bench fuel per 100 lb. of coal carbonized for the eighteen months is 14.22 lb.

In this connection the operation of the waste heat boiler and economizer may be of interest. For the last three months the daily average evaporation has been 112,768 lb. of water from feed water ranging from 50 to 80 deg. Fahr. This is equivalent to 156.6 nominal boiler-horsepower. The exhaust fan requires 14 electrical-horsepower. Assuming, for a steam-driven fan, say 19 hp., and an allowance of 15.6 hp. for the idle bench, we still have 122 boiler-horsepower from the waste heat gases available in steam. At 10 lb. evaporation this would require 8,784 lb. of coke per day, or 258 bushels. I leave you to assess the value of the coke. Figured in bench fuel, this quantity of coke would equal 3.1 lb. per 100 lb. of coal carbonized. The following temperatures are approximately maintained, although no permanent record of them has been kept:

Temperatures

Waste gases, boiler inlet, 1400-1450 deg. Fahr.
Waste gases, boiler outlet, 550 deg. Fahr.
Waste gases, economizer outlet, 400 deg. Fahr.
Feed water, economizer inlet, 50 to 80 deg. Fahr.
Feed water, economizer outlet, 210 deg. Fahr.
Steam (gauge) pressure, 125 lb.

Labor Problem Important Even with Continuous Verticals

After two and a half years' acquaintance with the house, I feel that the installation has justified its adoption. I believe that the plant contains possibilities, too, that we have not yet attained. Naturally some modifications have been suggested in the design of the benches, and have been incorporated in more recent installations. The heat control has been improved and will be improved still further in our benches when retort renewals are made. We have been disappointed in the difficulty in securing the proper grade of men necessary to operate the house, as I have previously noted. This has been in part due to the general shortage of labor, and in part to misjudging the grade of men required.

Before starting the house, I was led to believe that the labor problem was largely eliminated by the process. While the carbonizing process is largely automatic, the operators need to be able to distinguish between real and accidental variations in operation. This is determined largely by watching the rate of coal flow, which is frequently irregular. Occasional rodding of the retorts from the top is necessary, while excessive rodding tends to pack the semi-plastic coal and cause the charge to "hold up." The operators should be faithful, ever watchful, and able and willing to think as well as to work. The work is seldom hard, but it is exacting, and the results obtained will depend very largely upon this human element.

Popularizing War Sentiment

That the people of the land are coming to a practical realization of the earnestness of the war campaign is evidenced in the many agencies aiding the Government in the successful promotion of the earnest task it has undertaken. This is particularly true among the business men of the country, who have come forward with unstinted loyalty and devotion to Uncle Sam and are doing their "bit" on this side of the Atlantic in helping our boys "over there."

How well the various trades have fallen in line in this patriotic service may be seen by the progress of sales of the war savings and thrift stamps which are recorded by the chairman of the various trade fields under the guidance of the National Committee of War Savings Stamps.

An Unusual Advertisement

The advertising solicitor who has a hard time convincing a prospect that he should advertise what he has for sale can truly say, "Woe is me, but how the times have changed," when he has learned that a Chicago firm is spending money to advertise what it has NOT for sale. The following advertisement, which is one of a series being run in the Chicago daily press, speaks for itself:

Money Cannot Buy Chicago Solvay Coke

"The fuel without a fault"

at the present time. This is simply a transitory condition caused by the fact that the domestic tonnage of this efficient fuel has been officially diverted by the Government of the United States for the manufacture of a **necessity—GAS.**

Solvay Consumers Are Patriots

They are cheerfully burning other fuel until such time as they can get Solvay Coke again.

Pickands, Brown & Company
General Sales Agents
322 South Michigan Avenue, Chicago

Philadelphia Received Over Two Million Dollars Revenue From Gas Company Last Year

Upon receipt of the quarterly report of the United Gas Improvement Company for the final quarter of 1917, Controller Walton of Philadelphia announced that the total revenue received by the city in the year from the sale of gas was $2,223,629.49. Controller Walton said this is the largest annual sum received for any year the gas lease has been in effect. During the quarter ended Dec. 31, 1917, the U. G. I. manufactured and sold 3,138,250,260 cu. ft. of gas. In this period the company collected $2,904,993.07, of which the city's share was $588,993.43. The municipal revenue during the three previous quarters was: First quarter, $591,391.08; second quarter, $541,412.88, and third quarter, $501,832.10. The city's total in 1917 was $179,268.72 more than the 1916 figure, which was $2,044,560.77. Last year ended the five-year period during which, according to the terms of the lease, the city's share of the receipts was based on 20 cents of each $1 per 1,000 cu. ft. From now on until the lease expires, ten years hence, the city's share will be 25 cents and the company's 75 cents.

Eliminating Unwarranted Loss in Merchandising Gas Appliances and Putting the Retail Department on a Self-Supporting Basis

Alfred P. Post Shows Need of Reorganization and Tells How One Company Substituted Merchandising for Near-Merchandising

That retail appliance departments must be operated by gas companies both to protect the gas-consuming public and for the preservation of the gas business has long ago been proven and acknowledged. Still, it is apparent, though illogical, that many of these departments are now being maintained at a loss, or, as Alfred P. Post, of the American Gas Company, Philadelphia, Pa., expresses it, in his paper on "Merchandising Gas Appliances" prepared for the National Commercial Gas Association convention, on a near-merchandising basis.

An operating company, whose efforts and results in reorganizing the commercial department are explained by the author, realized that the core of the matter rested with the salesman and his remuneration. A new basis for figuring commissions and the use of continuous personal and printed publicity have eliminated unwarranted loss and placed this department on the same profitable basis as the many other purely merchandising concerns found in the business world.

In considering the subject of the merchandising of appliances by gas companies it may be well briefly to review the conditions that warrant or compel gas utilities to engage in the retail business.

During the past fifteen years there have been almost continuous voluntary or involuntary reductions made in gas rates which have not been met with equivalent decreases in costs of production and distribution. It has been possible partially to compensate for the reduced revenue per thousand cubic feet by increasing the volume of gas sales; thus absorption of overhead costs has probably been the greatest factor in making possible the survival of the gas business during the period mentioned. Still greater output of gas, however, is imperative, if gas companies are to withstand the ever-increasing cost of raw materials and labor, and aside from the development of industrial business (at necessarily low rates), no cause for increased distribution is to be hoped for excepting that of greater con-

THE COLUMBIA GAS & ELECTRIC COMPANY for January shows gross earnings of $1,254,951, an increase of $135,157. Operating expenses were $649,389, an increase of $156,392. Total net earnings and other income were $769,074.

sumption of gas by the smaller or domestic appliances, and possibly house heating.

Gas companies were forced to engage in the appliance business for but two reasons. Retail merchants who handled appliances did not specialize in them, but accepted such business as in the ordinary course of their retailing came to them. A large department store may have occasionally included in its general advertising some minor space advising the public that gas ranges could be had at certain seemingly attractive prices, but the effort was (and is) at best a seasonable one, and limited usually to a definite period of time, or to the exhaustion of one year's stock. For the balance of the year department store sight-seers might wander through the stove department and discover a reminder that the store still handled gas ranges.

General stores in smaller communities are just about as much interested in gas ranges as the large stores in the cities. They have many things to sell, and gas stoves happen to be among them.

If the independent dealers vigorously solicited, advertised and otherwise pushed the sale of gas consuming appliances, and were successful in selling what gas companies considered to be a sufficient quantity each year, it is very likely that the utility companies would not have found it necessary to enter the retail business years ago, nor would it be necessary for them to conduct such departments to-day.

This fact is considerably qualified by the second reason—and this is the one that compels the utility to continue its retail department—*viz.*, independent dealers do not always sell appliances the construction of which meets with the standards established by those in the gas industry who know best what is safe, what will give the most satisfactory service, and what possesses the greatest durability. Unfortunately, the gas-consuming public is still not as familiar as gas men wish it might be with the merits of good gas appliances and the demerits of poor ones. Nor does the public know where the function of good gas ceases, and where the shortcomings of poor appliances begin. The purchasers of non-standard appliances do not make complaints of poor service to the dealers who sell the appliances, but insist that the gas company is at fault, and ask that relief be given by the complaint department. The consumers do not care how old appliances may be, whether they are second-hand, or whether they are department store or mail order products; they simply demand that appliances be put into shape for satisfactory use, and in their own minds, and unfortunately in their conversation, too, they hold the gas company responsible. This condition makes it obligatory that the sales of appliances by gas companies, or sales directed or influenced by them, represent as much of the total appliance business in a community as possible. The old phrase, then, "quantity and quality" seems to express adequately the two reasons that necessitate the continuance of retail departments by gas companies.

If this reasoning is sound, that, for the preservation of the gas business and the protection of the gas-consuming public, retail appliance departments must be operated by gas companies, it is equally sound reasoning that such departments should be maintained at the expense of consumers. It is illogical that retail departments should be maintained at a loss to gas companies, because it is apparent such loss must be absorbed in the costs of the major, or the gas, department itself. Retailing appliances is not incidental to the gas business, but it is a necessary part of that business.

The consumer already using a gas range does not need the counsel of a gas company nor its stock from which to select, until the range has outworn its usefulness. The gas company should be able to supply such consumer with gas at a cost that does not include an amount sufficient to absorb the loss suffered by the gas company because it sells ranges to other consumers at prices below what it costs to complete these latter transactions. This thought applies also to every domestic appliance handled by gas companies. When appliances are sold at prices that do not cover all costs in connection with their sale and installation, they are sold at a loss! As previously stated, it is only possible to sell appliances continuously at a loss when such losses are absorbed by the operating costs of the gas department. In such case, if 10 to 20 per cent of the entire revenue of a gas company comes from the merchandising department, then the patrons of the gas department who furnish 80 to 90 per cent of the revenue are discriminated against! Self-supporting new business and merchandise departments, or the elimination of them as an alternative, alone offer escape from such discrimination.

For the purpose of non-technical discussion the merchandising department of a gas company has four primary costs in connection with its mercantile transactions, *viz.*, material cost, selling cost, installation cost and collection cost. Regarding material and installation cost, there is, of course, no dispute. Until 1913 this association did not formally recognize the inclusion of collection expense. At its convention in Philadelphia there were certain classifications of accounts covering merchandising practice which were adopted by it, and recommendations were made to the committee appointed by the American Gas Institute (which was then compiling the uniform system of accounts), which have since been adopted by the Institute and approved by the National Commercial Gas Association. Three of the items, therefore, are probably, without dissent, applicable to costs incurred by a gas company dealing in appliances. The other item is selling expense, and by this is meant promotion supervision, promotion supplies and expenses, advertising, soliciting and appliance demonstration. (It is here to be definitely understood that these sub-divisions of selling expenses are intended to cover only such as are met with in negotiating and consummating sales of domestic appliances and lighting units.)

Gas companies have found it necessary to establish show rooms, to invest in a suitable variety of stocks, and to advertise the features inherent in appliances in the matter of comfort, convenience and economy, and they have been further compelled to stimulate the business by personal solicitation. These overhead or selling costs have been just as compulsory for the joint protection of the public and the company as was the institution of a merchandising department in the first place. Departmental organization, and the ability of gas companies to give prompt service in the installation of standard appliances would not of themselves cause the public to purchase from such companies insufficient quantity to safeguard itself and give the companies that measure of increased gas revenue needful to its business. Selling effort was necessary.

There is no disputing the fact that the satisfactory conduct of appliance

departments is dependent upon continuous personal and printed publicity. This is a definite and necessary service for the protection of the gas-consuming public, in consequence of which the costs incidental thereto are properly included in the prices of merchandise sold, and as such should be justly borne by that portion of the public thus served.

A point frequently submitted during discussions on this subject is that companies engaged in the gas business can legitimately expend reasonable amounts in the promotion of their business, just as those engaged in other undertakings must make definite expenditures in order to sell their products. This point is well taken providing gas is the only commodity sold, because there is a vital difference between selling gas and selling gas appliances. Thus, when negotiating for the sale of industrial gas, it may be necessary incidentally to install a furnace, but the latter transaction is of relatively minor dollar significance. The sale of hotel cooking equipment is another illustration of transactions in which gas as fuel becomes such a predominant factor that some loss on the equipment itself is without much significance.

An exactly opposite condition obtains in the case of a domestic cooking appliance, because here the sale of the appliance may involve an amount that may not be equaled by the value of the gas used for a very long time. Certainly the expectancy of gas consumption bears a different relation to the value of the range than to the value of an industrial or hotel appliance. It is an unimportant matter if reasonable loss is incurred by a gas company when installing a major-consumption furnace, if industrial contracts stipulate guaranteed returns. Such guarantees, however, cannot be procured from domestic consumers, because the use of a gas range depends upon the size of the family, the habits and epicurean tendencies of the household, the frequency with which the range is used, the frugality of the cook, and many other factors that make it impossible to establish prospective consumption. Hence, why lose money on appliance sales when the element of utilization must necessarily be unassured? Moreover, probably half the domestic fuel appliances sold to-day are replacements—one company in a city of the first class estimates that two-thirds of its gas range sales are to people dispensing with old ones. Is that selling gas? Is it selling gas, when gas irons are put out at a loss, to consumers who formerly heated flat irons on a hot plate or on the top burner of a range?

Aside from the reasons just enumerated, which would make it appear that self-supporting new business departments are morally obligatory, it would seem, from the standpoint of good business, that unnecessary losses should be eliminated, and that the modern business thought, "Let each departmental tub stand on its own bottom," should be practiced. Other business undertakings do not find it necessary permanently to sell certain merchandise at a loss because different classes of goods are distributed by them. Perhaps a good analogy is afforded in the phonograph business. The instruments comprise appliances, and the records—in order to complete the analogy—may be viewed as gas. Certainly records cannot be played and would not be purchased excepting when instruments to play them had first been purchased. The records constitute the major element of the phonograph business, but in order to induce the public to buy them the instruments are not sold below cost. Discounts to dealers as high as fifty and ten are given, and the three or four manufacturers who are predominant in the phonograph industry have apparently not been disturbed much by the many smaller concerns who at different times have offered instruments free to those who guarantee the purchase of a certain quantity of records annually. Apparently it is good business to sell phonographs at a profit. It should be equally good business to sell gas appliances at a profit, and they can be, if those in the industry have the courage and ability to do so. The least that should be done is to sell appliances at sufficient gross profit to cover all selling and collection expenses incidental thereto. Companies need the additional revenue that would be earned by the proper pricing of merchandise, and the public would purchase goods so priced because it purchases all other goods on such a basis. It is also possible that gas company relations with plumbers might be improved if the latter had fair competition to meet.

Co-operation with plumbers is a subject discussed whenever gas men gather. The general character of that co-operation has so far consisted largely in doing house piping work at prices with which plumbers could not profitably compete. Connecting water heaters at prices on which an independent business could not survive is hardly the kind of co-operation that secures the lasting interest of plumbers. Years ago, "Plumber and Gas Fitter" was a common enough sign-board over a window, and the only reason it is extinct to-day is that work below cost became a gas company habit. Perhaps plumbers imposed excessive charges, but genuine competition on the part of gas companies would have remedied such evil, if it existed. It is not too late now to secure the real interest and friendship and support of plumbers, but it cannot be done by making prices on work that mean loss to a gas company and ruin to a plumber. Prices that mean business survival to a plumber may appear "outrageously exorbitant" when compared with gas company prices made on the basis of "We are in the gas business, and not merchandisers in the ordinary sense."

It may be thought that considerable difficulty would be encountered in the endeavor to adjust merchandise prices to meet all legitimate expenses involved, including selling expenses. The majority of solicitors in the employ of gas companies would state that a substantial increase in prices would cause a serious falling off in sales, that competition with dealers who handle inferior and lower-priced articles could not be met, and that there would most likely be general discouragement and disapproval of the attempt.

A simple expedient to meet such exigency would be first to correct the status of gas company representatives by paying them according to the dollar volume of business they create. Paying them according to the gas-consuming capacity of the appliances they sell is a good plan only when the purchasers of appliances agree to use them. Unfortunately, domestic consumers cannot be made to obligate themselves to use the appliances they buy. Hence the representative has negotiated a mercantile transaction only, and has not really sold gas. If, therefore, the dollar value on lighting and fuel equipment that he sells is

made the basis of his pay, and a fair commission arrangement is effected, no man having a right to call himself a salesman will object to including in the price of the article he sells a sufficient amount to cover the selling cost for which he himself is responsible. Furthermore, any salesman incapable of producing business sufficient to make himself self-supporting to his employer is misdirecting his energy—selling goods is not his forte.

An average merchandising business of $5 per consumer per year was established by a compilation of figures furnished by many gas companies for the year 1916. Two thousand consumers, according to this average, would purchase $10,000 worth of gas merchandise in a year. (On inquiry it is shown, by taking an average of large and small situations, that one salesman to each two thousand consumers is practicable.) One syndicate which is operating what is substantially a self-supporting new business department, is paying its salesmen on a commission basis of 15 per cent on the dollar volume up to $600 of sales monthly; all over $600 of sales bears commission at 20 per cent. On this scale of commissions, therefore, a salesman whose volume equals the average ($5 per consumer per year) will earn at the rate of $136 per month. Twenty-five-hundred and three-thousand-dollar salesmen are not unknown in the organization mentioned, and the sales of practically every man in the organization reach a volume and cause a gross profit sufficient to pay the salesman's earnings, and the proportion of advertising, collection and overhead expenses applicable to his sales. Details of this plan are given further on in this article.

Reverting briefly to salesmanship, is there any industry, because of its investment, its dignity and its general usefulness to the public, entitled to higher grade and better paid representation than should be found in the gas business? And yet how many of the usual run of gas solicitors who have been on the street for years could gain an interview in an ordinary business office? How do they compare, man for man, with the representatives of any other business of equal size and importance? Certainly they have not been the best paid class of gas company employees—but in other lines of business it will be found that the men who sell the goods, the men who create and keep the business going, are the men whose pay, as a class, is the highest. Of course, in other business undertakings the more a man sells the more profits he causes his employer to enjoy; per contra, in the gas business the more appliances a solicitor sells the more actual dollar loss will the direct result of his sales show. So a money-losing department could hardly be expected to recruit or hold in its ranks permanently men of very, high grade, because high wages cannot reasonably be paid to men whose successful work can cause only direct loss to their company.

Subscriptions to trade journals, courses of study, speeches by managers, ginger-talks by specialty men—all these are good, and undoubtedly cause their measure of mental improvement and enthusiasm but the one natural, universal and eternal urge, the one and only consideration that is certain to attract a salesman and cause him to love his line, is the pay—the money. And the selling departments of gas companies are not famed for their money-making possibilities. Until gas companies can offer terms to salesmen that equal in earning possibilities the selling positions in other lines of business, gas companies cannot expect to attract or hold men who are representatives of as high grade as those found in other lines.

The irksome canvass or door-to-door work so necessary to the appliance business has been offered by new business executives as an explanation for the difficulty encountered in maintaining a first-class selling force. It is said to be difficult work, unattractive because of its grind and monotony, its subjection to rebuff and reluctant interview, and so forth; but in what branch of the selling art are these features eliminated? Your well-dressed man, reasonably glib and grammatical of speech, thoroughly conversant with his line, will turn off these difficulties as mere incidents in his business and sell goods where they are needed. The householder, like other humans, will buy what is needed and what is best, and pay a proper price; but the need and the quality and the price will be more readily accepted when skilfully set forth by a man who looks and talks like and is a business man.

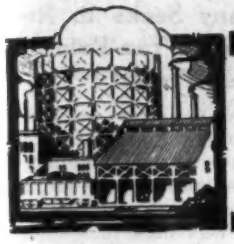
Men of real familiarity with business and business principles do not linger in the selling force of gas companies; as a class, their business ability soon leads them into avenues where better rewards are offered for their talents. Thus the quality of salesmanship that remains finds it hard to convince consumers that new and better and, necessarily, more costly appliances are needed. Gas companies for many years have sold goods below cost (for anything sold at a price that does not include selling expense is sold below cost), and solely because salesmen of insufficient caliber have been employed. Correct the status of appliance salesmanship, put it on the same basis as the salesmanship that the rest of the business world has found proper, and losses in the new business department will disappear.

The experience of one company operating a number of subsidiary gas utilities may be interesting.

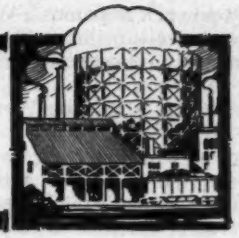
Prior to 1916 the combined new business costs of the subsidiaries, less merchandising profits, averaged $20 per $100 of sales. Promotion costs amounted to 30 per cent of sales, and mercantile profits 10 per cent. Salesmen were on a salary basis, and were paid from $60 to $125 monthly—depending upon length of service, assumed skill, circumstances under which they were employed, etc., and in many cases upon their courage to ask or demand increase of salary. Here, then, was a condition of new business affairs common enough, typical of gas company methods generally, and in accord with accepted practice. "Costs per thousand," "costs per consumer" and "costs per dollar of sale," etc., went along in harmony with the figures of other representative concerns with whom comparisons were occasionally made.

It had been decided in 1915 that net new business costs were really net new business losses, and as such were unnecessary; that business principles were violated when losses were unnecessarily suffered, and that steps were to be taken, beginning with 1916, to eliminate, as far as possible, all losses, "new business" or otherwise. Accordingly, the field was surveyed, much

(*Continued on page* 214)



NEWS OF THE GAS INDUSTRY



New York City Gas Output for January Totals Over a Billion Cu. Ft. More Than Last Year

Because of unparalleled cold weather and the scarcity of coal, New York City used 1,281,292,800 more cubic feet of gas last month than it did in January, 1917. The total amount of gas delivered was 6,650,315,700 cu. ft., as against 5,369,022,900 for the same period in 1917.

The Brooklyn Borough Gas Company production increase 60.83 per cent; that of the Brooklyn Union Gas Company 15.19 per cent, and that of the Kings County Lighting Company 41.42 per cent. The increase of the Queens Borough Gas & Electric Company amounted to 21.21 per cent.

According to figures reported to the public service commission the largest single increase in the amount of gas delivered to consumers was that of the Consolidated Gas Company, which sent out more than 800,000 cu. ft. above its production for January, 1917, representing an increase of 25.86 per cent.

Gas Company Again Comes to Aid of Fuel Committee with 500 Tons of Coke

The Providence (R. I.) Gas Company has again come to the assistance of the City Fuel Committee in the effort to serve the general public with fuel. In addition to the 1,000 tons of coke sold through the office of the City Fuel Committee, the gas company, through its president, John R. Freeman, recently offered an additional 500 tons of coke.

Knowing the extreme suffering of the public, the gas company has gone to the expense and time of having an engineer measure the present stock and after computations of measurements were made the company generously extended the above offer.

President Wilson Instructs Secretary of Treasury to Interest Himself in Insuring Adequate Service on Part of Utilities

Mr. McAdoo Points Out Vital Relation of Utilities to War-time Needs—Will Interest Himself in Rate Increase Matters Where Necessary—Possibility of Credit Extension for Expansion

No gas company that is rendering good service and is not getting an adequate return need longer have any doubts that justice will be done. This is assured by President Wilson's instruction to Secretary of the Treasury McAdoo to interest himself actively in the matter of public utility rates. The important relation of the public utilities to the life of the nation, and especially to its war-time needs, is recognized. Even expansion and the construction it will entail may be provided for if the War-time Finance Corporation bill is adopted. The utilities have been officially recognized. The onus is upon their shoulders of demonstrating that the confidence that has been shown in their efficiency and intentions is not misplaced.

Following the receipt of communications from several of the big public utility corporations asking that State and local authorities be urged to consider quickly arguments for readjustment of rates which would tend toward maximum of efficiency, William G. McAdoo, as Secretary of the Treasury, brought the matter to the attention of President Wilson.

He received a reply from the President expressing the conviction that the public utilities formed a vital part of the war machinery and authorizing him to take up with the proper officials, when circumstances might make such action advisable, the problems involved.

The representatives of the public utilities had brought before Mr. McAdoo what they believed to be the necessity for a general increase in rates if service was to be extended to meet the increased demands of war-time activities. It is possible that some consideration may be given by the Federal Government to the question of extending credit necessary for expansion, especially if the War Finance Corporation bill is adopted.

The utilities in which the Federal Railroad Administration will interest itself are street railway, light, heat,

Request Made to Change System of Payments in Elgin, Ind.

The Western United Gas & Electric Company has petitioned the public utilities commission for permission to divide Elgin, Ill., into ten districts, each with a different discount period, to lessen congestion in the office the 11th of each month. The company asks that discounts be allowed for fifteen days following the reading of the last meter in each district.

Oakdale, Cal., Company Seeks to Increase Rates

The Oakdale Gas Company, which furnishes gas for Oakdale and Riverbank, Cal., has filed with the railroad commission an application for authority to increase its gas rates from $1.75 for all use a month, with a minimum rate of $1 a month, to $2 flat rate and $1 for a minimum charge. The application says that the increased cost of fuel oil for gas manufacture, together with the increased cost of labor, requires the obtaining of this permission.

and power companies. Where it appears necessary increases in fares or rates may be suggested.

MR. MCADOO'S APPEAL

Copies of the correspondence between the President and Mr. McAdoo were made public recently. The Secretary's letter to the President follows:

FEB. 15, 1918.

"Dear Mr. President: I beg to hand you herewith several memoranda and letters relating to street railway and other local public utilities furnishing light, heat and power, which I have been asked to bring to your attention by a committee representing public utility interests.

"These papers indicate the existence of genuine apprehension regarding the adequacy, under present conditions, of the services and rates of local public utilities. The view is expressed that increased wages and the high cost of essential materials and supplies have affected them as they have affected everybody else, and that united effort will be necessary in order to meet alike the public requirements for service and the corporate financial needs upon which that service depends.

"As Secretary of the Treasury, I must take official notice of these matters. It is obvious that every part of our industrial and economic life should be maintained at the maximum strength in order that each may contribute in the fullest measure to the vigorous prosecution of the war. Our local public utilities must not be permitted to become weakened. Transportation of workers to and from our vital industries and the health and comfort of our citizens in their homes are dependent upon them, and the necessary power to drive many of our war industries and many other industries essential to the war is produced by them. It may be that here and there, because of the prominence given to less important interests immediately at hand, State and local authorities do not always appreciate the close connection between the soundness and efficiency of the local utilities and the national strength and vigor, and do not resort with sufficient promptness to the call for remedial measures. In such cases I am confident that all such State and local authorities will respond promptly to the national needs when the matter is fairly and properly brought before them.

"Our public service utilities are closely connected with and are an essential part of our preparations for and successful prosecution of the war, and the unfavorable tendencies which the accompanying papers reveal may most effectively be checked, wherever they may be found to exist, and the needed relief obtained, only by prompt action on the part of the respective local authorities.

"I earnestly hope that you may feel justified in expressing the conviction that the vital part which the public utilities companies represent in the life and war-making energy of the nation ought to receive fair and just recognition by State and local authorities.

"Cordially yours,
"(Signed) W. G. McADOO."

PRESIDENT WILSON'S REPLY

This is the President's reply:

"THE WHITE HOUSE,
"WASHINGTON, Feb. 19, 1918.

'My Dear Mr. Secretary: I have examined with care the memoranda and letters which you transmitted to me with your letter of the fifteenth. I fully share the views you express regarding the importance of the public service utilities as a part of our national equipment, especially in wartime. It is essential that these utilities should be maintained at their maximum efficiency and that everything reasonably possible should be done with that end in view. I hope that State and local authorities, where they have not already done so, will, when the facts are properly laid before them, respond promptly to the necessities of the situation.

"I shall be glad to have you communicate with the local authorities whenever the information in your possession suggests that such a course is desirable and in the national interests.

"Cordially yours,
"(Signed) WOODROW WILSON."

Rates Increased at Several Illinois Cities

The State Public Utilities Commission has authorized the Illinois Northern Utilities Company, of Dixon, to make an emergency increase of 15 cents gross per hundred cubic feet for gas in the cities of Dixon, Belvidere, De Kalb, Geneseo, Mendota, Sterling and Sycamore.

Ohio Company Seeks to Recover Income Tax Paid Under Protest

Suit for the recovery of $15,361.38 with interest from June 23, 1910, alleged to have been collected illegally as income tax under the corporation income tax law of Aug. 5, 1909, was filed in United States District Court recently by the Cincinnati (Ohio) Gas & Electric Company against Andrew C. Gilligan, as collector of internal revenue for that district.

In its petition the company says it leased all of its properties to the Union Gas & Electric Company Sept. 1, 1906, and since that time has not transacted business within the meaning of Section 38 of the Act of Aug. 5. After the income tax act was passed, the company says, it made its return of income for the year 1909, showing the same to be $1,536,137.55, but at the same time the company declares it set out this was not an income subject to tax under the provisions of the law.

Nevertheless, the company adds, taxes totaling $15,361.38 were assessed against it and formal demand was made by the collector of internal revenue for the payment of this assessment. To avoid penalty, the company says, it paid the tax under protest on June 23, 1910, and afterward made a claim to the United States Commission of Internal Revenue for a refund, which was rejected Jan. 23, 1918, by the commissioner at Washington.

Court is informed the Union company pays the special excise tax imposed under the income tax law upon the net income derived from the operation of the gas and electric properties in Cincinnati and vicinity,. and that the plaintiff's income is simply the rentals paid by the Union company under the terms of the lease. The company contends these rentals have been paid out to stockholders as dividends, and for the reason the company is not engaged in business, as the same is defined in the income tax act, its income was not subject legally to the tax imposed upon it.

Court is asked to award judgment for the full amount of the taxes so assessed and collected, together with interest at 6 per cent from the date of payment.

Chicago Commission Defers Rate Increase Decision Until March 11

The Illinois Public Utilities Commission, after hearing both sides of the Peoples Gas Light & Coke Company's request for a 22 per cent rate increase on Feb. 26, deferred decision till March 11. Attorney Daily for the company sprang a surprise by announcing that the Peoples company had never considered ordinance as a contract, and asked for the increase on the flat statement that it could not operate with profit on present rates, nor would it be able to fill the demands for service unless the increase was granted.

Attorneys for the city opposed on the grounds that company broke contract and that commission without power interfered with city's rights to set gas rates. In reply the attorneys for the gas company pointed to last paragraph of commission's order authorizing rates sets in ordinance of last year, in which commission specifically reserved the right to change rates. They also stated that the gas company must have increased rates to avert bankruptcy.

Readiness-to-Serve Charge Effective March 1, at Long Island

A "readiness to serve" fee of 50 cents will be charged monthly on every active gas meter owned by the Long Island Lighting Company, beginning March 1. Consumers were notified of the new fee recently through cards sent out by the company, reading in part, as follows:

"Owing to the increased cost of labor and material necessary to the production and distribution of gas, the Long Island Lighting Company finds it imperative, in order to partially meet such largely increased expenses, to place, in addition to the present standard rate for gas, a 'readiness to serve' charge of 50 cents per month on each of its active meters, to become effective March 1, 1918, and to be applied on bills thereafter rendered."

The company hopes that the additional charge will only be temporary.

New President of New England Association of Gas Engineers

J. ARNOLD NORCROSS

New President of New England Association of Gas Engineers Has Had Unusually Interesting Career

Since Graduating from Stevens Institute of Technology, J. Arnold Norcross Has Worked on Gas Works Operation and Construction in United States, Europe and China —Built Government Plant at West Point

Gas engineering as a profession is not so conducive to wandering over the four corners of the globe, as is civil engineering, for instance. But J. Arnold Norcross, the new president of the New England association, has outwandered even the civil engineers with few exceptions. The offices he holds at the present time—secretary and treasurer of the New Haven (Conn.) Gas Light Company and vice-president of the Derby Gas Company—are in a way misleading, in that they give no hint of the career behind their holder.

Mr. Norcross is essentially an engineer, having been graduated from Stevens Institute of Technology as a mechanical engineer and being now a member of the American Society of Mechanical Engineers, American Society of Civil Engineers, American Gas Institute, a director of the Illuminating Engineering Society and a member of the Society of Gas Lighting and the Guild of Gas Managers.

He was born in Derby, Conn., and entered the gas business in 1891 in the employ of the Consolidated Gas Company of New York, under William H. Brady, chief engineer.

In 1893 he was in charge of the construction of the Government gas works at West Point.

After this service he was with Humphreys & Glasgow, of London, England, for nine years, constructing and operating carburetted water gas plants in many countries in Europe and one in Shanghai, China.

He went to the New Haven company in 1903 as engineer, succeeding Freman C. Sherman. In 1905 he attained the offices of secretary and treasurer, which he holds at the present time. He is also vice-president of the Derby (Conn.) Gas Company.

Denver Gas Rates Increased

The Denver Gas & Electric Light Company has been granted rate increases and discount reductions, effective Feb. 1, by the Colorado Public Utilities Commission, and the changes will mean considerably more revenue to offset the higher costs of operation.

Discounts on straight rate gas will be 10 cents instead of 15 cents a thousand feet. After the readiness-to-serve rate is paid consumers will be charged 65 cents a thousand feet, instead of 60 cents with a discount of 5 cents a thousand feet.

In its petition to the Colorado commission the company claimed it had to meet three advances in wages in 1917 and that coal prices had advanced 100 per cent. The company had a coal contract expiring in 1921 at $1.25 a ton delivered at the mine. This price is now $2.50, and the freight rate $1.85 a ton. Approximately 1,500,000 gal. of oil are used to enrich the coal gas, and this oil has now advanced from 3 to 5 cents a gallon.

Improvements at Bellefontaine, O., Progressing

Work on the new gas plant is going forward with pleasing progress as a result of the moderated weather. The building is practically completed.

Eliminating Unwarranted Loss in Merchandising Gas Appliances

(*Continued from page* 210)

research work was undertaken, and many interesting facts brought to light.

Subsidiaries were found to be discriminating—losing $5 on a gas range installation to one consumer and refusing to furnish a $5 appliance gratis to another appeared, on the face of it at least, to be discrimination. At any rate, it was considered unfair to tax gas consumers with losses on appliance transactions. It was found, too, that fitters, clerks, and even laborers were receiving higher pay than many salesmen—"solicitors" they were then called.

Advertising was done, of course, but too often it was of a kind that merited the criticism given much of gas company advertising by J. H. Appel (publicity director, Wanamaker stores) at the Washington N. C. G. A. convention. Some of the subsidiaries expended more for printed publicity than for personal solicitation. Others spent scarcely anything for newspaper advertising, and some nothing.

Little or no real relation between volume of sales and selling costs could be established by the figures that were compiled. Price making, too, was a matter that depended, apparently, in many cases upon nothing but what it was timidly supposed the customers would pay. Nor were standards of output observed. That is, it was not definitely predetermined what number of a given appliance should be sold each year, and results were judged entirely by gain or loss in comparison with other periods.

Despite the disclosures of the investigation here briefly enumerated, solicitors and new business managers were nearly unanimous that the very top prices possible were placed on appliances, that advertising was of a highly satisfactory order, and that every intelligent effort was used to conduct the appliance department in a modern businesslike manner. However, it could not be denied that merchandise was regularly marketed below cost!

The determination to eliminate losses was, in effect, the conversion to and adoption of business principles. Solicitors were to become salesmen; they were to be paid what they were worth, what they could earn on a commission basis. The commissions were to be calculated on dollar volume, the same as in nearly every other commercial sales plan. Prices were to be figured to include commissions and all other selling costs, so that $1 volume became the chief consideration. The rate of 15 per cent on $1 volume was determined, because it was found that $4 per year per consumer was the previous average appliance business of the companies in question, and that two thousand consumers per salesman was the smallest calling list of any. Thus, $666.66 represented the average monthly business per salesman, and must result in an average earning per man of $100 monthly—a substantial increase over the previous average. To reward greater skill and extra effort, an additional 5 per cent was given on all sales in excess of $600 monthly.

To receive full credit for sales, it was necessary that the men bring in signed orders. No claim for sales could be set up because a salesman had "called on a customer" who was, therefore, "his" prospect. People buying at the salesrooms (unless meeting a salesman by appointment) simply swelled the "office sales." Five per cent was calculated on office sales, and divided pro rata among all the outside salesmen as an offset to the old-time prospect claim. (Incidentally, many hours of clerical labor were saved by the discontinuance of prospect files, wrangling over credit for sales was eliminated, and the companies, by the restriction of commissions to 5 per cent on office sales, were by such economy to receive some direct benefit from their newspaper advertising.) Whatever salaries the salesmen had previously been paid were continued—not as salaries, but as drawing accounts against commissions to be earned. From past experience it was estimated that the average direct selling costs to the company would be less than 17 per cent of the selling price of appliances. (An average of 16½ per cent has since been definitely established.)

Advertising appropriations were authorized to the amount of 2 cents "per meter" per month. This figure was slightly in excess of the former average for all the companies. However, the general increase in selling prices could not in view of all the conditions involved, be less than 25 per cent, so that the $4 of annual sales per consumer would automatically become $5 per year. As a matter of fact, sales actually approached an average of $6 per consumer, in consequence of which 2 cents per meter per month became approximately 4 per cent on sales. This is still the advertising appropriation.

Here, then, are two fixed items:

Direct selling cost...16½ per cent
Advertising cost .... 4 per cent

which leaves a balance of .... 9½ per cent to cover promotion supervision, promotion supplies and expenses and appliance demonstration. Thus 30 per cent on amount of sales was established, and methods of price making planned, so that a gross profit of equal percentage could be realized and the overhead expenses met.

An illustration of price making is here given—(gas fuel appliances was selected as the mercantile division most important, because of its $1 preponderance):

Price Formula—Gas fuel appliances store room cost plus installation cost plus 50 per cent.

Store room cost, of course, includes purchase costs, freight cartage and handling.

Installation cost includes labor, pipe, fittings and incidentals in setting appliances.

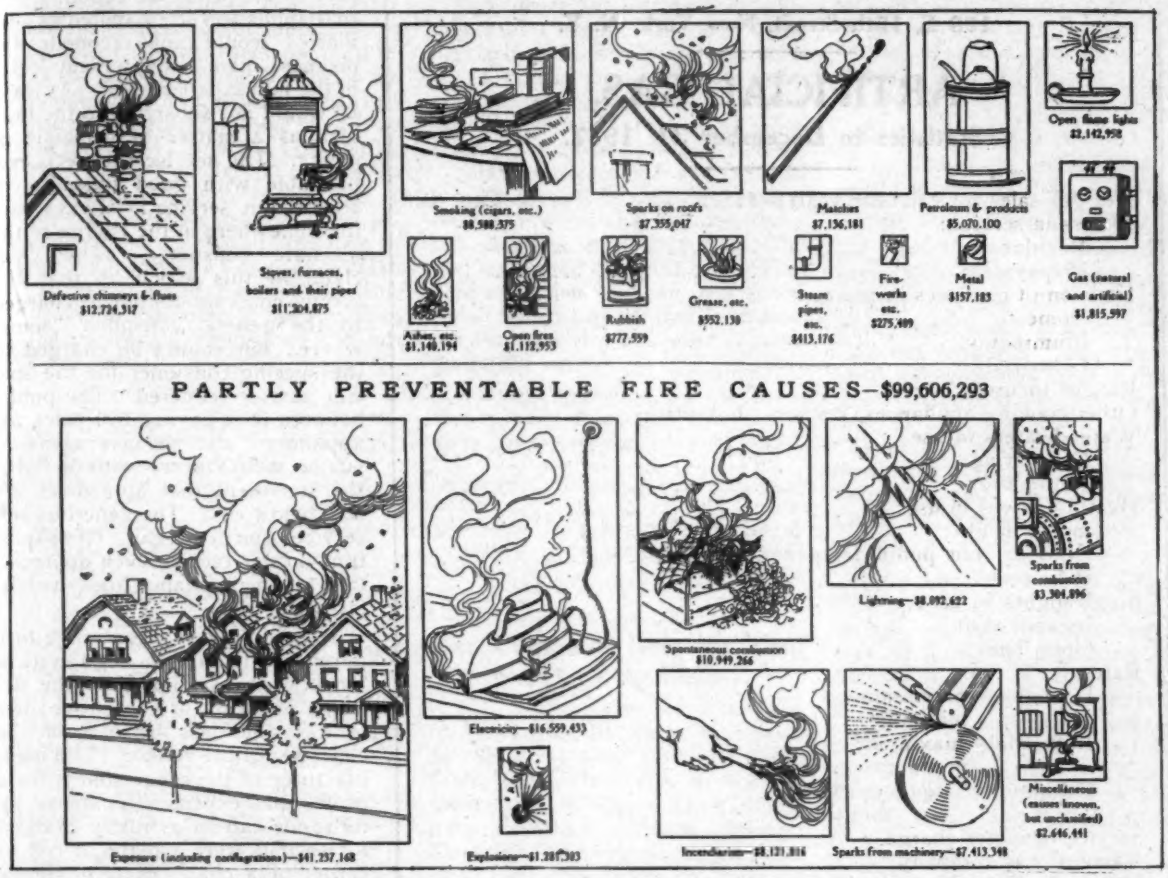
Fifty per cent added to cost yields a gross profit of 33 1/3 on sales, but this was required to meet elements of merchandising not covered by the promotion group of accounts, viz.: uncollectible bills and discounts.

The organization, part of whose merchandising methods are here reviewed, had for six years in use a store room and job order system that provided detailed labor and material costs on each piece of work, so that figures were instantly available on one or an indefinite number of jobs of a given character. Thus, the cost of installing a range or water heater, or the average on a hundred of them, or an average for a season, or "fuel run in" or not, ad lib, were constantly on hand. Hence, an estimated or assumed average installa-

(*Continued on page* 216)

The Great American Bonfire

STRICTLY PREVENTABLE FIRE CAUSES—$60,466,054



UNKNOWN FIRE CAUSES (PROBABLY LARGELY PREVENTABLE)—$48,632,993

FIRE LOSS FIGURES FOR 1916—COMPILATION HAS TAKEN THIRTEEN MONTHS OF STEADY LABOR—GAS CAUSES ARE WELL DOWN IN THE LIST, BUT 1917 SHOULD BRING THEM STILL LOWER

Important Questionaire Sent Out by National Commercial Gas Association

Wisdom and foresight demand that the gas industry prepare its case at once and stand ready to show the extent and importance of its service to the public and to the nation at large. No gas man in authority needs this fact proved to him. Essential industries throughout the United States are being called upon for information regarding their relation to the country's business and economic status.

At present we have no definite figures which will show the size of the artificial gas industry as an essential service to domestic, public and industrial consumers of light, heat and power. The information on which a reasonable estimate could be made is also lacking and can be supplied only by the gas companies themselves.

It is for the purpose of gathering figures as definite as is possible, considering the nature of the information desired, that the National Commercial Gas Association has prepared and sent out to all gas companies the questionaire printed herewith.

When exact figures are obtainable, the association asks that they be given, always with the understanding that such information will be considered strictly confidential. Where estimated and approximate figures only are available, the association requests that the estimate be furnished by the officer or employee of the company best able to judge the case.

Attention is called to the U. S. Geological Survey Report of Sales of Artificial Gas for 1915 in which the total is divided into 48 per cent domestic, 30 per cent illumination and 22 per cent industrial. It will be of interest to all gas companies to compare the composite figure which the questionaire will provide for 1917 with this 1915 division.

The association is undertaking in the collection and compilation of the data called for in the blank, a most important work. If your company has not yet made its returns, see that the blank (a reproduction of which is shown on next page) is filled out at once and sent to N. C. G. A. headquarters.—*Monthly Bulletin.*

Questionaire Now Being Sent Out

NATIONAL COMMERCIAL GAS ASSOCIATION.

128 E. 15th Street, New York, N. Y.

ARTIFICIAL GAS.

Statistics to December 31, 1917.

Net gas sales for calendar year 1917..... cu. ft.
Meters in service:
- Regular .....
- Prepayment .....

Division of gas sales in per cent
- Domestic ———
- Illumination ———
- Industrial ———

Ranges in use: .....
Other cooking appliances: cookers, hot plates.....
Water heaters in use:
- Circulating .....
- Automatic .....

Heating stoves in use: .....
Arc lamps in use:
- Outdoor (not public lamps) .....
- Indoor .....

Single lights in use:
- Incandescent .....
- Open flame .....

Rates:
- Domestic—maximum .....
- minimum .....
- Industrial—maximum .....
- minimum .....
- Minimum charge—yearly .....
- monthly .....

Service or meter charge .....
Name of gas company .....
Name of officer furnishing information .....

Eliminating Unwarranted Loss in Merchandising Gas Appliances

(*Continued from page* 214)

tion cost could readily be used determining what amount to add to the "Store Room Cost."

Since commercializing its new business departments the company's losses in respect to selling appliances have become negligible. Indeed, some of the subsidiaries have conducted their departments with sufficient merchandising skill to turn in a profit. Sales have increased as to distribution of units, and the $1 volume of business has, of course, made a long forward movement. No salesmen have yielded to the call from outside the organization "for position with better pay and greater prospects." On the contrary, their earnings compare favorably with those of most road men, and they have the advantage of constant home life. The company salesmen are now interested in gas for lighting, because there is real money in it for them, and building up a gas fixture business is one splendid way to keep ahead of the drawing account in certain months of the year. This suggests, too, the interesting disappearance of the peak in business during April, May, June and July, for somehow the men have found goods salable the rest of the year to an extent not noticeable prior to the adoption of the methods now in use.

The ordinary business man engaged in a commercial undertaking other than utilities would find the foregoing somewhat bewildering. "Self-supporting retail departments?" he would say. "Why, what business to-day carries a department that is not self-supporting?". The fact that the gas business is the prime undertaking, and that appliances are handled as auxiliaries would not reconcile the business man to permanent losses in the minor department. At least, he would not subscribe to the loss-idea as a matter of principle or policy. The service theory is reconcilable with good business, of course, but service is always paid for somewhere in the charge to the ultimate consumer. The chief claim in this article is that the service costs should not be charged to the general consumer "somewhere," but should be charged to the specific consumer for the specific service rendered. The public believes it is paying full price for appliances, and the average consumer would greet with derision the statement that appliances are sold below cost. The generous and service-spirited gas companies thus do not receive even appreciation for the appliance losses voluntarily suffered.

The delivery of a gas range to a purchaser is no less legitimate a business transaction than the delivery of an oil or coal stove; nor is its value less because of the character of the vendor. The manufacturer of the range sold it for a profit, and expenses incidental to its resale can be as justly charged for as if it were a piano, a roll of carpet or a chair—even though a gas company negotiate the resale! One company, at least, operating many utilities in a number of States, East and West, took this view two years ago, and its experience and methods have been very briefly outlined herein. If the distribution of more appliances means greater consumption of gas, that company is enjoying the increased consumption. But it is enjoying more—the satisfaction of merchandising, not near-merchandising, the first result of which is a substantial conservation of income by the elimination of an unwarranted loss. And not the least pleasing effect of adopting standard business principles has been the fair though tardy recognition of the salesmen, the men who sell the appliances without which the gas cannot be used, the men whose work is second to none in importance, and whose earnings have become likewise.

Northern Illinois Company Shows Growth In Last 3 Years

Despite the higher cost of labor and materials a gain of approximately $68,000 in the net earnings for 1917, as compared to those of 1916, is announced by the Public Service Company of Northern Illinois in a circular of Halsey, Stuart & Co., of Chicago, offering $2,000,000 of the Public Service Company's two-year 6 per cent collateral gold notes. A letter from Samuel Insull, president of the Public Service Company, to Halsey, Stuart & Co., gives the following figures as indicative of the growth of the company's business in the last three years:

	Years Ended			
	Dec. 31, '14	Dec. 31, '15	Dec. 31, '16	Dec. 31, '17*
Gross earnings	$6,656,898	$6,903,228	$7,783,157	$8,840,322
Operating expenses and taxes	3,656,685	3,749,370	4,508,483	5,497,355
Net earnings	$3,000,213	$3,153,858	$3,274,674	$3,342,967
Interest charges	1,461,461	1,492,280	1,497,818	1,614,867

*As officially estimated.

Mr. Insull also reports that the company's gas department served 65,281 patrons in 1917, compared to 61,134 in 1916 and 56,743 in 1915. The company operates in thirteen counties surrounding the city of Chicago.

The annual meeting of the stockholders of this company will be held in Chicago on Feb. 25, next. A new board of directors will be elected and other business may be taken up.

Attleboro Company Now Asks Higher Raise in Rates

The Attleboro (Mass.) Gas Light Company has amended the petition it filed with the State gas and electric light commission, asking for a 10-cent increase in the gas price, which is now $1 net for a thousand feet, a note of which appeared in the Feb. 16 issue of the AMERICAN GAS ENGINEERING JOURNAL. The amended petition asks for an increase of 15 cents. A hearing will be given in Attleboro March 4.

The company claims that still further increases in cost, since the filing of its petition, must be taken into account. The company will attempt to show that the costs have increased 25 cents a thousand feet and that a 10-cent increase would leave too heavy a burden for the company to bear. A 15-cent increase will not meet the present costs, but will apportion the deficit more equitably until normal times return, the company will assert.

Providence has just ratified an increase of 15 cents, making a dollar net the householders' price. Gloucester, a smaller company than Attleboro, asked for a 25-cent increase last October, and was given 15 cents. Lynn put a 20-cent raise into effect.

Among other facts that will be brought out will be that the company recently ordered coal and obtained a rail shipment at $7.70 a ton. The coal was seized in transit by the Fuel Administration and an emergency supply was finally secured from Boston for Attleboro at a cost of more than $12 a ton.

Gas Company Releases Coal On Hand At Illinois

The North Shore Gas Company, of Waukegan, Ill., recently released to the Reiss Coal Company 2,000 more tons of soft coal, thus giving them a right to sell it. The gas company explained through Manager Hart that they were willing to run a little close themselves in order to make available more coal for local use, and the feeling was general that it was a commendable thing on their part, as it will help much in relieving the situation.

Personal Notes

ARTHUR W. DARBY, who is at present superintendent of the Municipal Electric Light Plant of Holyoke, Mass., has been appointed to the position of superintendent of the Municipal Gas Plant, made vacant by the resignation of O. W. Adams, which was noted in the Feb. 9 issue of the AMERICAN GAS ENGINEERING JOURNAL. Mr. Darby will hold down both positions.

J. L. MATTHIAS, manager for the Leominster (Mass.) Electric Light & Gas Company plants, has resigned to take effect April 1. He will go into business for himself in Worcester. Mr. Matthias has recently been elected chairman of the mercantile bureau of the Chamber of Commerce.

THE MERIDEN (CONN.) GAS LIGHT COMPANY recently held their annual stockholders' meeting and re-elected the following directors for one year: Charles F. Linsley, Edgar J. Doolittle, John L. Billard, Charles A. Learned, Clarence P. Bradley, Edward Miller, Jere D. Eggleston, E. A. Hall and Arthur S. Lane. Immediately following this meeting the directors re-elected the following officers of the company: President, Charles F. Linsley; secretary, H. C. Borthwick; treasurer, James H. Hinsdale and general manager, Charles A. Learned.

THE SPRINGFIELD (ILL.) GAS & ELECTRIC COMPANY at a meeting held recently elected the following officers: B. C. Cobb, preisdent; A. D. Mackie and W. H. Barthold, vice-presidents; E. E. Corken, secretary; R. E. Eddy, assistant secretary; E. L. Sturtevant, treasurer, and directors, W. H. Barthold, B. C. Cobb, A. D. Mackie, J. W. Bunn, J. F. Miller, George Reisch and William Ridgely.

THE INDIANAPOLIS (IND.) GAS COMPANY held the annual meeting of shareholders recently in the offices of the company in the Majestic Building. The following officers were re-elected for the ensuing year: Volney T. Malott, president; L. C. Boyd, vice-president and manager; W. J. Yule, secretary; Arthur V. Brown, treasurer. Directors were re-elected as follows: Arthur V. Brown, Volney T. Malott, L. C. Boyd, Gavin L. Payne and Fred Dickson, of Indianapolis; J. G. Schmidlapp, Cincinnati, and W. G. Irwin, Columbus, Ind.

JOHN CONNOLLY died Feb. 12, after a four weeks' illness, in his seventy-fifth year. He had been retired for about twenty years. For about twenty years he was employed by the Arlington (Mass.) Gas Light Company as superintendent of repairs, prior to this being with the E. H. Brabook Company, of Boston.

Construction Notes

New Oxyacetylene Generating House to Have Safety "Powder Roof"

An oxyacetylene generating house is being built in the Boston & Albany yards, West Springfield, Mass., at a cost of about $30,000. The building, which is 51 ft. long and 22 ft. wide, will be equipped with a special roof, which will be made to "blow up" in case an explosion occurs, and the force of the discharge will be wasted. The walls will remain intact and a new roof will be built in short order. The oxyacetylene will be made in the building and a piping system will carry the gas to all the shops in the yards, thus doing away with the portable oxyacetylene machine now in use.

The building will be of brick and the cement foundation already is laid. Ten men under Superintendent De Lahaye, who had charge of building the roundhouse roof, are rushing the work. Weather conditions to date have seriously hampered the laborers, but four weeks will probably see the structure completed and ready for use.

Petition Filed for Construction of New Plant in Chautauqua, N. Y.

The South Shore Natural Gas & Fuel Company has filed a petition with the public service commission asking for permission to construct a gas plant in Mayville, Chautauqua County. Although the construction is finished and gas is being furnished, notice of the fixing of the petition will be served on all interested.

The company furnishes natural gas in many places in Erie County. Its capital stock is owned by the Frost Gas Company of Buffalo. The local franchises were granted and the construction done before the property was acquired by the Frost company, and without approval of the public service commission, under Act 68 of the public service commission's law. The Frost company was notified that it had no authority from the commission, and this resulted in filing its petition.

Three Rivers, Mich., Gas Booster Installed

The gas booster has been placed in operation at the Three Rivers Gas Company's plant. Much trouble has been experienced all over the city in the past to secure sufficient pressure at certain periods of the day. With the booster in place it was no trouble to bring the pressure to the desired height. It is run by an electric motor. It is found necessary to make certain adjustments to make the use of it most effective.

Gas Producers Being Installed at Palmer, Mass., Plant

The Wright Wire Company, Palmer and Worcester, Mass., is preparing to make its own gas, and is installing gas producers at its Palmer plant.

Two carloads of steel for one of the two Chapman gas producers have arrived. The gas producers were ordered some five months ago, and the first was delivered on contract time.

The Eastern Bridge & Structural Company is fabricating a steel building with overhead bunkers holding 60 tons of coal for these producers, which will be erected within the next few weeks.

The gas producers that the Wright company is to install are of the vertical revolving type, classifying 2,000 pounds of coal tar per hour at full capacity. The coal bunkers over the producers are supplied from a coal hopper at track level, which empties directly from the car to a horizontal conveyor.

This conveyor delivers to a pot at base of a vertical conveyor. The vertical conveyor or elevator discharges from an elevator 50 ft. above the base into chutes discharging to the bunkers through the roof of the producer house.

This equipment, when completed, will take coal from the car and by entirely mechanical means deliver gas to the eight tempering furnaces eventually to be built.

These tempering furnaces are continually reducing the temper from the wire that has been hardened in drawing, so that the wire may be drawn to suitable sizes. It also performs the most important duty of slow air cooling, which tempers and toughens the stock to a degree not attainable by any other process, and thereby adds to the breaking strain and tortion, or twisting, and bending strains to which wire rope is subject.

Thus, as will be seen, the gas producers, in conjunction with tempering furnaces which they will serve, form an indispensable unit in the manufacture of wire.

War Department Takes Option on Sight for Gas Plant

—The United States Government is about to establish a great plant in Maryland for the manufacture of poisonous gas to be used by the American Army in France.

Details of this project are not yet a matter of official announcement, but it is known that the site has been tentatively located and that the Ordnance Bureau is at work upon the plans for the new Government enterprise.

An option has been taken on a large area of land, it is said, at Stump Point, Cecil County. More than 1,000 acres of ground is involved, and as soon as the deal is closed the Government will be prepared to proceed with the work of construction.

Stump Point was selected, it is stated, because of its proximity to the Harford proving ground. This point is at the mouth of the Susquehanna River and within hailing distance of Perryville, where the railroad connection can be made. The proving ground is only a few miles away, and may be reached either by rail or by water.

Franchise Asked by Natural Gas Company

The Spokane-Benton County Natural Gas Company has made application to the city commissioners for a franchise to lay mains in Yakima, Wash., and maintain and operate a gas distributing plant. The company is developing the gas fields in Benton County, 45 miles east of Yakima. As the franchise is drawn the city commissioners will not seriously consider it, but the commissioners are not averse to encouraging competition with the Pacific Power & Light Company, which now supplies the city with gas, and is asking permission to raise its rates materially.

THE AMERICAN GAS COMPANY declared the regular quarterly dividend of 2 per cent, payable March 1, to stock of record Feb. 20.